Pit and Quarry

Published Bi-weekly on Wednesday for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and other Non-Metallic Minerals By

COMPLETE SERVICE PUBLISHING COMPANY
538 S. Clark St., Chicago, Ill.

HARRY W. BAUMGARTNER, President
V. E. LARSEN, Vice-President
S. E. COLE, Eastern Representative
1235 Watchung Place
Plainfield, New Jersey

HAROLD W. MUNDAY, Editor
JOHN O. DURKEE, Associate Editor
GEORGE B. MASSEY, Associate Editor
F. A. WESTBROOK, Associate Editor
W. E. TRAUFFER, Associate Editor

Subscription price $5 for 3 years; $2 for 1 year. Single copies 25c
Canadian and Foreign Subscriptions $1 additional for each year.

Entered as second class matter October 9, 1928, at the post office at Chicago, Illinois, under the Act of March 3, 1879.

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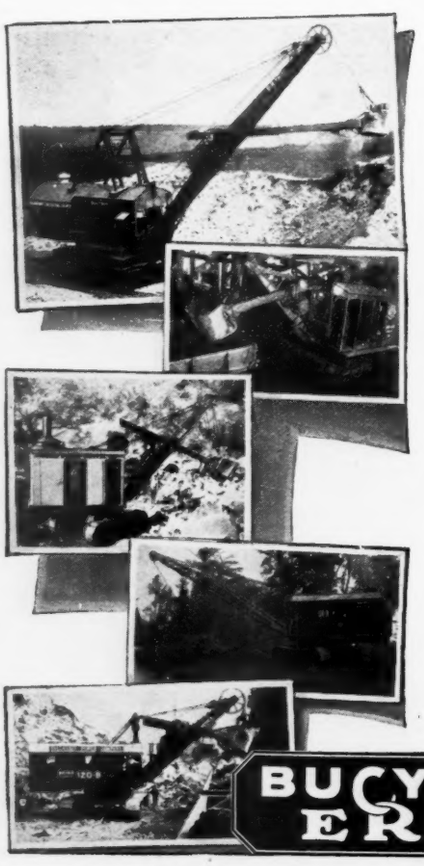

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WHAT ABOUT YOUR FINANCIAL POSITION?

FINANCIAL problems in the non-metallic mineral industries are often a major consideration at this time of the year. There are some factors involved in the analysis of financial statements which are worth a little study.

A balance sheet is an orderly statement showing the financial condition of a business at a given date, setting forth the assets, liabilities and net worth of the business. In order to present properly the condition of the business, the net worth section of the balance sheet should be analyzed so as to show the changes from the date of the previous balance sheet.

Balance sheets are prepared for the purpose of showing the owners of the business its condition as at a certain date, to show security holders the condition of the business and to provide bankers with a basis to judge the "credit-ability" of the business. Balance sheets should have certain features of the business emphasized according to the use to which they are to be put. A sheet prepared for stock holders should emphasize the investment in productive equipment; for investors, the security behind the investment and for bankers especial attention should be given to the net working capital.

The balance sheet is a picture of the financial condition of the business at a given date. It should account for all the assets of the business and all of the liabilities to creditors. The difference between these groups represents the net worth or ownership of the business. This ownership may be represented by the investments of the owners (in the case of soie proprietors or partnerships) or the capital stock, surplus and reserves in the case of corporations. In balance sheets of certain institutions, the difference between the assets and liabilities is generally known as working capital or contingent reserve. In analyzing reserve accounts it must be remembered that some reserves do not represent ownership. As for example a "reserve for taxes" is merely an appropriation of expenses incurred to be paid at a later date. Insurance reserve and reserves of a like nature are merely an estimate of expenses of this nature which may have to be met later. Any excess of these reserves over actual expenses as determined later is a part of the surplus or owner's equity in the business. Depreciation and depletion reserves are mere valuation accounts off-setting any overstatement of these asset accounts due to wear and tear or the removal of minerals from the grounds. These reserves are deducted from the assets, but both the cost of the asset and the reserve should be stated on the balance sheet, so as to show what provision has been made in the expenses of the business to offset the losses due to depreciation and depletion.

The "income statement" is a statement showing the results from operations over a given period. An income statement should always accompany a balance sheet and the two should be studied together. In order to enable the investor or the banker to study properly the balance sheet and its accompanying income statement, the balance sheet should contain figures showing the position at the beginning and at the end of the period covered by the income statement. With the balance sheet in this form a better study can be made by comparison of the changes in the asset and liabilities account.

The study of the balance sheet should include the cash position, the working capital position, the ratio of ownership equity to the total indebtedness and whether or not distribution of net income is justifiable. The cash position and the working capital position should govern the distribution of the earnings. There should be no distribution of net income when the cash position of the business does not warrant such distribution.

The liabilities of the business should be arranged or grouped according to length of maturity. "Accounts payable" as a general rule should mature within thirty to ninety days; notes payable, including acceptances, should mature over periods longer than one year. The cash position of any healthy business should enable it to meet these maturing obligations at the time they are due. If the cash position of a business is such that it is unable to discount liabilities when due, this cash position is injurious to its credit. The average business should endeavor to keep its cash position so that the ratio of cash to current liabilities be maintained around twenty-five per cent.

The working capital of the business is the excess of its current assets over liabilities. The current assets should consist of items which can be converted into cash in the usual course of the business. Close watch should be kept on any asset which loses this degree of convertibility, and it is better

for the business to take a small loss on a slow moving current asset than to permit this asset to become "frozen" to such an extent as to cripple the business. The ratio of current assets to current liabilities should be from 200 per cent to 300 per cent. A decline in this ratio to 150 per cent should be watched carefully, and the management should make every effort to bring this ratio up. The ratio and especially the cash position should be increased prior to maturity of fixed obligations in order that the maturing obligations may be paid or refunded. Businesses with good working capitals are in position to refund maturing obligations on better terms than concerns having small working capitals. Profits should not be distributed when the cash position will be weakened to such an extent as to prevent the concern from taking discounts or to such an extent as to weaken its credit. Collections should be watched, and accounts receivable should not be permitted to increase disproportionately to sales. The writer knows of a recent audit of a concern which showed profits of about 15 per cent on the capital, but there could be no distribution of profits because the cash position would not warrant such a distribution. The accounts receivable had increased to such an extent that the concern was not able even to discount its maturing obligations and as a matter of fact was compelled to borrow funds for current operations. This is an indication of poor management, and it means that the debtors are running their business at the expense of this concern.

The total of all assets represents the total investment in the business. The total of all real liabilities on the balance sheet represents the extent to which the owners are using someone's money in the business. It is obvious then that the larger the investment by the owners, the better the creditor's position. This is of especial significance in the event of funded indebtedness. A decreasing ratio of owner's equity weakens the creditor's position. and inversely an increasing ratio of ownership strengthens the creditor's position.

The relation of fixed or funded indebtedness to total indebtedness should also be studied. A high ratio of funded indebtedness to total indebtedness means that the business is burdened with heavy fixed charges which must be met regardless of business conditions. Slack business means that the ratio of fixed charges to profits increases very rapidly, and in some instances this ratio is such that the margin of profit is almost, if not entirely wiped out.

Ratios should be shown on the income statement showing the ratio of expenses to revenues. This ratio will show the extent to which the income is used in expenses. Decreases in gross earnings are not always accompanied by corresponding decreases in operating expenses, because a certain portion of the expenses is fixed, and it is not possible to decrease them in the same ratio as gross earnings sometimes decrease. Fluctuations in gross earnings should be watched very closely, and expenses should be pared proportionately with decreases in gross so far as it is possible to do so.

The nature of the products manufactured or sold by the business should be studied. It is obvious that businesses handling luxuries or commodities affected by styles or obsolescence should be watched more closely than businesses handling necessities.

With all of these studies, which are important, of course, the real factors are the value of the assets and the earning power. These factors are in the balance sheet and the income statement and we must look to them for the worth of the business.

RECENT STEPS IN BUSINESS SELF-GOVERNMENT

GILBERT H. MONTAQUE of the New York Bar discussed this subject before the New York Crushed Stone Association at the Pennsylvania Hotel in New York City on October 26, 1928. The following is a digest of his address.

Never has the Government gone so far as during the past year in its encouragement, support and enforcements of business self-government by business and trade groups.

One industry after another, in trade conferences called by the Federal Trade Commission, is today adopting rules for eliminating trade abuses, which rules are all registered with the Commission, and are daily being enforced with all the strength of the Commission's authority behind them.

What this means, in upbuilding the tone and morale of American business, can hardly be overestimated. Business ethics are created, not by laws, but by the opinion of business men.

All the laws in Christendom are powerless to raise the business standards of a single industry above the level reached by the preponderance of public opinion among the reasonable and fair-minded men in that industry. This truth most people entirely overlook, when they are pushing new legislation to improve business standards.

Business self-government, simply because it is self-government and not government imposed from an outside authority, is creating for business higher standards and more rigorous enforcement than have ever been attained either by the governmental authorities or the courts.

Forward-looking leaders in the business world now recognize in trade associations a long awaited opportunity for business men, through methods of trade self-government of their own selection, to correct a large number of vexations and long standing abuses.

MEN OF THE INDUSTRY

The portraits printed on this page in each number of PIT and QUARRY are taken from our files and their selection is without significance as to current events or as to the position of the individual in the industry.

Charles C. Depew

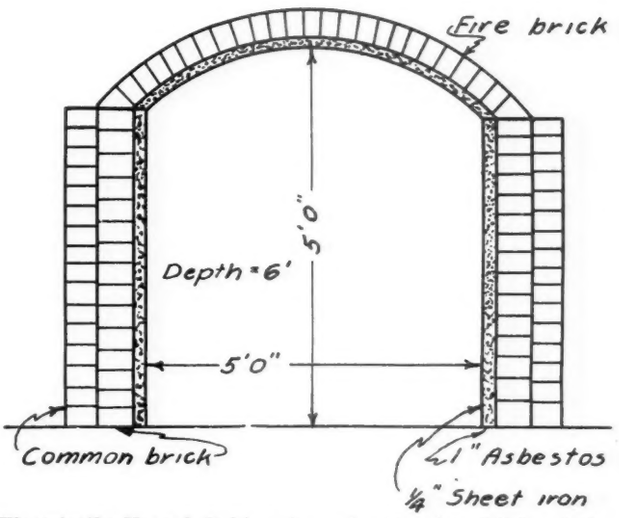
Mr. Depew Is General Manager
of the Lake Sand Corporation
of Chicago, Illinois.

A MODERN ELECTRICAL REPAIR SHOP FOR THE VERMONT MARBLE COMPANY

By F. A. Westbrook

IT MUST be the dream of the head of the electrical department of every large industrial establishment to have a well equipped repair shop. So often these shops are stuck away in some dark, out of the way corner where the quarters are congested and the equipment none too good or conveniently arranged. This is not the case with the Vermont Marble Company. Here the electrical department has 1100 motors to maintain, many of which see the hardest kind of service in the quarries and other outdoor locations. In addition to this, a great deal of other electrical apparatus must be maintained.

In view of these conditions, it is not strange that the company has a first class electrical repair shop, located at the home plant in Proctor, Vermont. This is a central location to which motors and other items of equipment may be brought from the other operations of the company, extending for many miles north and south along the main line of the Rutland Railroad. Sometimes motors are sent in by rail and sometimes by truck. Facilities are provided for receiving them by either method of transportation. Figure 1 shows the front of the shop and it will be seen that a railroad siding has been extended along one side of it and that an approach for trucks has been made. The swinging crane with a two ton Yale traveling hoist is used to lift the heavy motors from either trucks or railroad cars and deposit them at the door of the shop either on a hand truck on which they can be taken wherever desired in the shop or on the ground. Inside there is a two ton traveling crane which picks up the motors from the ground at the door or from the hand truck and places them where wanted.



Electrically Heated Baking Oven for Burning Off Insulation

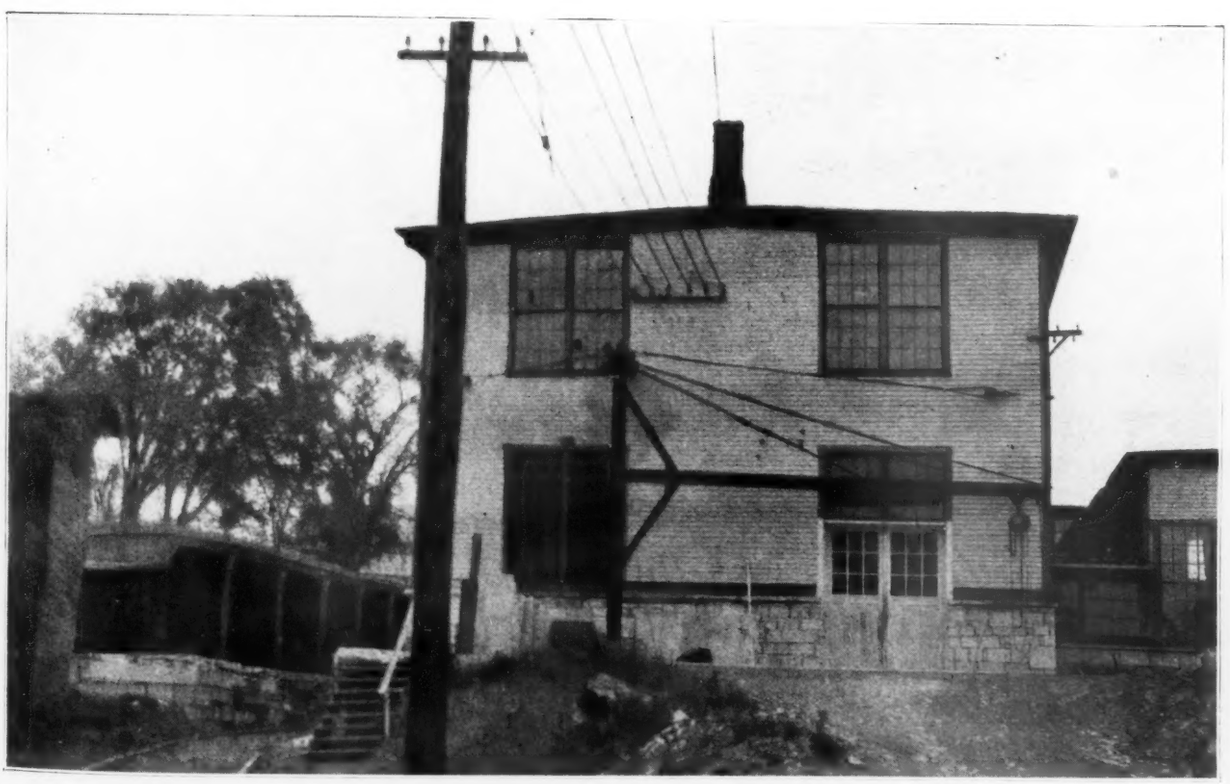


Fig. 1—View of Repair Shop and Showing Railroad Siding, Approach for Trucks and Traveling Hoist

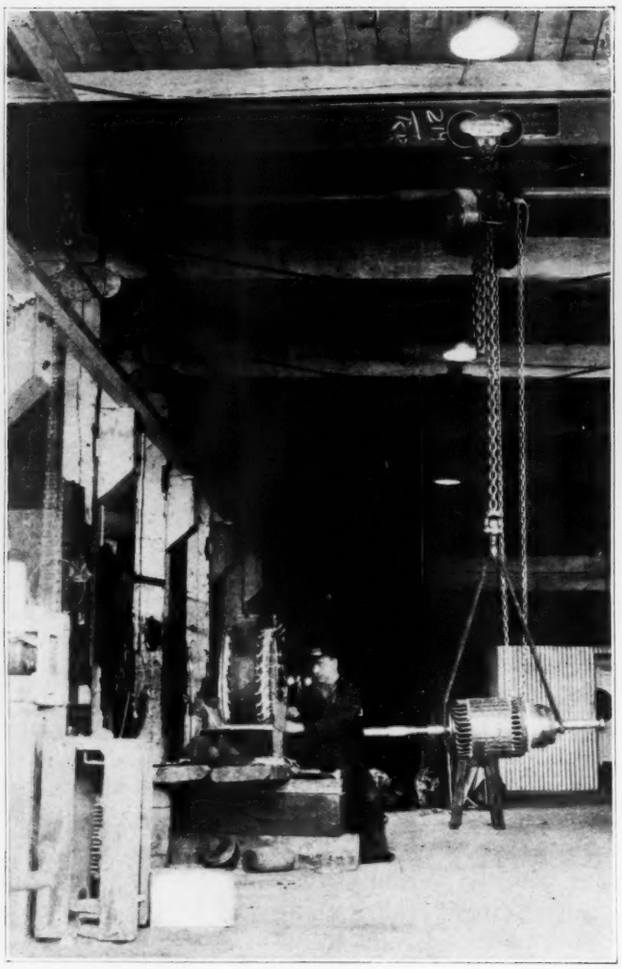


Fig. 2—View of Interior of Repair Shop Showing Traveling Crane

At one end of the building there is an electrically heated baking oven, a fireplace for burning insulation off copper wires and, between them, an electrically heated paraffin tank and a varnish dipping tank. Another swing crane with a two ton Yale hoist has been provided here also for handling heavy pieces of apparatus. The baking oven was

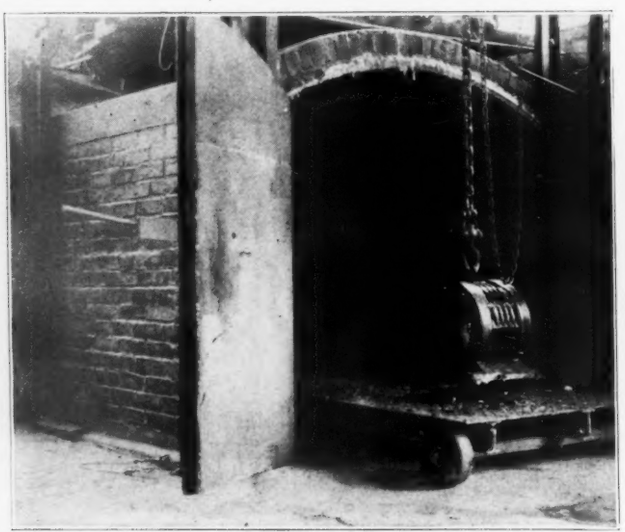


Fig. 3—Entrance to Drying Oven and Showing Motor Being Placed on Hand Truck

Fig. 4—Fireplace, Motor Being Lowered into Dipping Tank and Paraffin Tank

designed by the electrical department and built by the company. As shown in the diagram the sides consist of a double wall of common brick and the arched top of a single thickness of fire bricks set on edge. Next to the brick there is a lining of asbestos one inch thick and the whole inside is completely lined with ¼ inch sheet iron. The inside dimensions are 6 feet deep, 5 feet wide and 5 feet high at the center. Motors are placed on an iron truck with the help of the crane as shown in Figure 3 and pushed into the oven. Heat is supplied by means of Cutler Hammer space heaters, divided so as to obtain three heats in two k.w. steps. They actually consist of twelve 500 watt units and each step is controlled by a Federal safety switch. The entrance is closed by means of two swinging doors as shown in Figure 3.

An interesting thing about this oven is that it did not function properly until ventilation had been secured. This was not accomplished until a small hole was cut in an upper corner of the door and another at a diagonally opposite corner of the back of the oven. A small electric fan was then placed at the latter opening thus making a circulation which effectively removed the damp air and made the drying characteristics of the oven satisfactory.

The fireplace for burning off insulation from scrap wire is simply made of brick and is provided with counterbalanced vertical sliding door. It is used for two purposes. One is to burn the insulation off scrap preparatory to selling the copper as junk. In such cases the wire is put in the fireplace with a piece of oil soaked waste which is set on fire. The other purpose is to burn the insulation off motor coils before removing them so as to make it easier to take out the coils. This is done by heavy electrical currents so as not to damage the motor. Heavy parts are placed in this oven by means of the swing crane and hoist in the same way as in the baking oven.

As already stated, the dipping tank is between

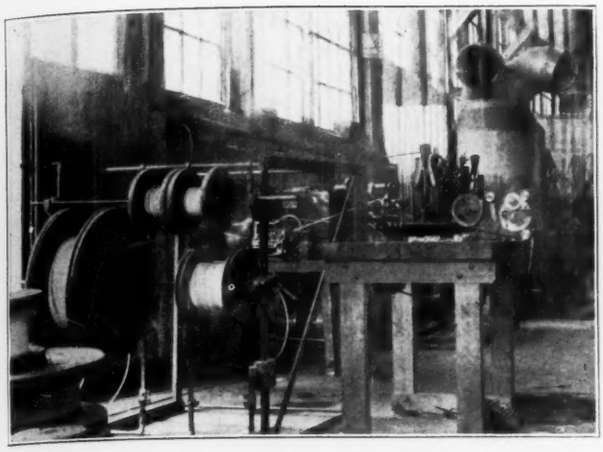


Fig. 5—Interior View, Showing Reel Rack, Coil Shapes and Coil Winder

the baking oven and fireplace. Figure 4 shows a motor frame and stator about to be lowered into it by the hoist, which travels on the swinging crane. The paraffin vat for boiling out coils is directly adjacent to the dipping tank, so it will be seen that all of the heat using equipment is segregated in one corner of the building.

The shop contains a number of other very useful labor saving machines. Among them is a Browning loop and field winder served by a reel rack holding nine reels with tension devices. There is also a Browning coil spreader. A shear for cutting heavy paper insulation has been found to be very useful, and a good lathe has also been installed. It has been found that material savings can be made by winding coils in the shop instead of sending them away to manufacturers for replacements. The cost of making them in some cases being only one third that of buying them. It also obviates the necessity of keeping several thousand dollars worth of spare coils in stock for emergency repairs and, in many instances, has saved important losses in production by making quick repairs possible.

The store room for electrical supplies is on one side of the building. It is also spanned by a traveling crane for the handling of motors and transformers. Spare motors of all sizes are kept here for the immediate replacement of motors which fail in service so as to reduce shut downs of machinery as much as possible.

Worker's Earnings Increase

Earnings of workers in manufacturing plants of the United States are increasing, it is indicated by the latest data of the U. S. Labor Department. The average weekly pay envelope of employees in mills and factories contained $27.08 in August, a study of figures reported by 11,000 manufacturing establishments reveals. In the same month a year ago the average pay per employee for one week was $26.60, or 48 cents less than this year. In August, 1926, approximately $26.64 per week was paid on an average, or 44 cents less than in 1928. This year's level is found to be 97 cents above that of 1925 when $26.11 was paid. It is $1.56 higher than in 1924 and 88 cents higher than in 1923.

The reports received by the Labor Department come from plants in 54 industries which employ a total of more than 3,000,000 workers. Each plant reports once in 30 days the number of persons on the payroll and the aggregate amount paid weekly. The number of employees divided into the total payroll gives the average earned per employee in all plants in one week.

New Automobile Production Record

Automobile production in August broke all previous records for the industry. Approximately 458,400 machines were turned out during the month, reports to the U. S. Commerce Department show, surpassing by 33,000 the number produced in May, 1928, the former record month. The August total is 150,000, or nearly 50 per cent, more than the output for August last year, and 35,000 more than in the same month in 1926. The year 1926, it will be remembered, was the record twelve-month period for production in the auto factories.

August deliveries include large gains for both passenger and business vehicles. Passenger cars produced total 400,600 machines, compared with 274,400 in August, 1927, and 380,300 in August, 1926. Truck output was 57,700 for the month, as against 34,400 last year and 42,000 in 1926. These totals are believed to establish new all-time production records for both classes of machines.

National Bank Resources Increase

Resources of national banks now average 58 per cent greater per bank than they did eight years ago, an examination of the latest data of the Comptroller of the Currency reveals. Resources reported in July amounted to $3,706,000 for each national institution.

The financial power of the national banking system increased approximately $300,000 per bank during the past year, the data show. On July 1, 1927, resources averaged $3,409,700 per bank. In 1926 the average was $3,173,200. In 1925 it was $3,016,700, and in 1924 it was $2,791,100. In 1923 the amount was $2,610,300, and in 1922 it was $2,510,100. The average national bank this year has $1,970,000 in loans and discounts, it is found; $375,000 in U. S. Government securities; $552,100 in other securities; $546,000 due from other banks, and $41,000 in cash.

Total resources reported by the banks at the last call amount to $28,508,239,000; deposit liabilities, $22,639,337,000; paid in capital stock, $1,593,856,000. Banks reporting numbered 7,691.

SAFETY AND PRODUCTION

By A. W. Beresford*
President, American Engineering Council, New York City

PURELY from the basis of reason it is evident that the creed of the safety engineer—a safe plant is an efficient plant—is well founded.

That the reduction of personal hazard should automatically increase performance rates is evident. That the decreased interference of the unforeseen with orderly procedure must result in added hours of such increased performance is equally evident. The accuracy of the reasoning is obvious and has resulted in the acceptance of the conclusions, but there has been little or no data to determine the degree in which the correlation made itself evident in the industrial fields.

A beginning was made toward collecting such data in the report entitled "Safety and Production" by American Engineering Council, and made possible by the National Bureau of Casualty and Surety Underwriters. There is no thought to quote that report save to say that the conclusions, as might be anticipated, justified the creed and put some measure of fact behind the theory enunciated. That added data over wider fields will emphasize these conclusions and amplify the proof seems certain. We therefore stand in the position of having expended considerable amounts of money and effort to demonstrate the existence of a relation already accepted, and question may well arise as to the justification for such expenditure.

This justification lies in the frequency with which facts and relations are accepted, but accepted without realization—without instinctive incorporation in the consideration of the problems of which they are a part. Anything which promotes that instinctive incorporation is of value; and the conclusions evolved by methods of reason, and their importance may, by physical picturing, be presented in a way which more definitely fixes them in the mind and results in realization and use. Actual data transforms the abstract generalization into concrete fact.

Today therefore, it may be stated as a fact and not as a generalization that in the industries thus far examined, efficiency in production goes hand in hand with betterment in safety record, and that this condition exists in major degree.

That this betterment in safety performance is an end to be sought and sought diligently is a tenet of modern thought, quite aside from any economic benefit that may result. Plain considerations of humanity demand it and, with the past record of accomplishment to indicate the possibilities of future performance, will continue to demand it.

It is a fair statement that that which intelligent public opinion demands and continues to demand, will ultimately come to be. There is therefore no reason to doubt that this demanded betterment in safety performance in industry will surely be attained, either through the understanding effort of industry, or failing that, through compulsory measures. The records accruing from understanding effort make evident what can be accomplished, and nothing short of that accomplishment will be accepted.

But added to the humanitarian pressure there is the provable economic consideration that this betterment, intelligently obtained, not only costs nothing but pays dividends; and where betterment is not in evidence it can be assumed only that there exists lack of realization of the fundamental conditions or lack of understanding of what is necessary to attain it.

It will be attained only by the exercise of the same procedure which must be employed to obtain any desired industrial advance, for instance, high production rates.

The desire for high production rates is bred of economic pressure, personal gain or professional pride. It is effective when it becomes the animating impulse of the operating head of a concern and receives his continuing intelligent attention and effort. He instills it in his immediate subordinates, leads them in the measures necessary to accomplishment and rewards them in the degree in which there is accomplishment. With them he evolves the plans to secure it, and with their help he builds the organization essential to the carrying out of those plans. He continually fosters within that organization the morale which binds it into a unit whole with a single major purpose and keeps alive the incentive to achievement.

Through personal contact and report he is continually in touch and knows and appreciates the men and the means through which those problems are solved. In the minds of no one contributing to the final result is there left any doubt as to his aim or his willingness fully to co-operate in the attainment of the desired end.

Betterment in safety performance requires the same procedure. Primarily the operating manager must possess a keen desire for accomplishment. This desire he must press on his lieutenants. He must show that continuing interest in the attainment of the end which will leave them in no doubt of his earnestness of purpose. He must plan with them to the desired end and must with them evolve the organization and measures to accomplish it. By personal contact and report he must know the

* Presented before National Safety Congress.

progress in accomplishment and the men and means responsible for that accomplishment. There must be no doubt in the mind of anyone in the organization of his attitude toward the work undertaken, his vital interest and his willingness to co-operate. As in all other activities only such singleness of purpose will be effective. A mere concession that the work is desirable and a consent that it be carried on will accomplish little—no more in fact than would a similar half-hearted attitude toward the securing of high production rates.

If then there be found in any concern a progressively deteriorating condition in safety accomplishment, or even a merely negative or permissive attitude toward betterment, no conclusion is possible other than that the operating head of the concern is either content to permit recurrent casualties, or does not realize, or is unwilling to assume his responsibility toward reduction of those casualties.

But whether due to lack of realization or unwillingness, the responsibility is his, and to his account must be charged the happenings, certain to occur, resulting not merely in loss of money, but in human disablement in varying degree and even in loss of life. No one else can adequately initiate and maintain effective the measures essential to their reduction.

Legal responsibility there may not be, for only in minor degree can the problem be solved by statute, but morally he must personally accept the burden.

This is true because more is required than the mere provision of safeguards required by law or for which reductions in premium are allowed. These are effective in degree but are wholly effective only when there is created and maintained in every individual in an organization a habit of mind which regards safety as a primary requisite to efficient operation, and which accepts the individual's responsibility to contribute to that end. Such a mental habit can be created and maintained only by the recognized leader, and then only if he himself possesses it.

To summarize: Betterment of safety performance is inevitable. It will come through the operation of one of two forces, viz.: Public opinion embodied in statute plus the economic pressure of increasing premiums, or the realization by management of its responsibility. The first will be slow, irritating and expensive. The second may be rapid, promotive of harmony and profitable both to management and man. To attain these results, however, there must be complete understanding and acceptance of the fact that betterment is a function of the individual, not of the mass, and a function of every individual in the mass.

What is required is the acquisition by each workman of a mental habit which without conscious mental process recognizes hazard and impels him to avoid it, the acquisition by each supervisor of a sense of his daily and continuing responsibility to guard against hazard and to detect and emphasize the instance in which avoidable risk is taken, and in the management, the understanding acceptance of the direct and continuing responsibility of each individual therein. These things are as true for the small company as for the large.

The materials and methods for creating such a habit of mind have been developed and are available, but the vitalizing spark which makes and keeps them effective is the belief and sustained effort of the operating head. In this as in all else the organization mirrors the man who leads it. As he thinks and does, so will it think and do.

Once convinced of his sincerity and active interest there will develop in the organization through department chiefs, superintendents and foremen, to the man at the bench and the laborer in the yards, an understanding co-operation which accepts the value of safety appliances and recognizes the hazard to all which lies in their neglect and the consequent justice of penalty for that neglect; which breeds intelligent analysis of existing conditions and measures and eliminates—not merely the accident, which frequently is only a symptom of an underlying condition—but the condition itself.

There is ample proof in the report of American Engineering Council, and in the experience of those plants in which betterment in safety performance has been attained in high degree, that these statements are true.

Rotary Cement Kiln

The output of a rotary cement kiln is increased by passing the gases through the kiln at greater than the usual speed. A speed of 30 ft. per second is preferably maintained in the clinkering and decarbonating zones, and a speed of 22 feet per second in the drying zone. G. Martin. Brit. 282, 868. Sept. 27, 1926. C. A.

"Real Substantial Dope"

Accept my admiration of the method you people use in placing this publication before the operator. Several times before I had started to subscribe but every time I would just put it off by saying "What good will that magazine do me?"

Now I believe that it contains real substantial "dope" that will be beneficial to our industry.

Trusting that we shall be in position to help each other in the future, we are

Yours very truly,
CRYSTAL SAND CO.,
Mission, Texas.
(signed) By D. S. Basye, Sec.-Treas.
(A three-year subscription accompanied)

USE OF SLAG ON ROADS IN AUSTRALIA

By E. F. Stevens

THE use of slag in Australia was limited to only a few short lengths of road until about three years ago, when the Main Roads Board of New South Wales came into existence. This body has, in conjunction with the Newcastle authorities, reconstructed quite a number of main roads, the most important of which, in that district, is that from Newcastle to Maitland.

It is constructed of slag throughout its 20 miles of length, mostly by the penetration method, one length only, 5 miles long, being to a premixed specification. The specification provided for three course work, that is, two base courses each consolidated to 4 inch thickness, and a penetration course, giving a total depth of 11½ inches.

Where this has been placed on a reasonable foundation, the results have been excellent, the only weak places being found on lengths traversing virgin ground on several deviations. The good results obtained in this particular work have been responsible for a wider use of the material, which has always been regarded with a good deal of suspicion. Until the advent of the Main Roads Board there was not a big demand for road materials. The position there is that people are rapidly waking up to the fact that the slag in any particular gauge is truer to gauge than the corresponding sizes of metal, is actually cheaper in price, and there is more of it to the ton. Successful results are obtained from slag fines, the ⅜ inch material when used for binding in surface treatment of roads, and more of this material can be sold than is produced. While the quantities used here would appear small to Americans, this particular highway has about 4,000 tons of slag to the mile for 15 miles, and several other shorter jobs.

Highways Now Being Built To Care for Traffic Growth

"Traffic congestion, until recently a serious problem only in the cities, has moved outward and now imposes its time consuming delays and menace to life and property upon the principal highways near large metropolitan centers," says Thomas H. MacDonald, chief of the Bureau of Public Roads of the United States Department of Agriculture.

"Such congestion points especially to the necessity for acquiring rights of way of ample width tc allow for future widening or the making of definite provision for future acquisition as needed. It also demands that highways be designed for safe use at higher speeds, and that arterial routes be improved with the service of the entire route in mind. In metropolitan areas, congestion has emphasized the urgency of grade crossing elimination, wider pavements, and the building of relief and by-pass highways."

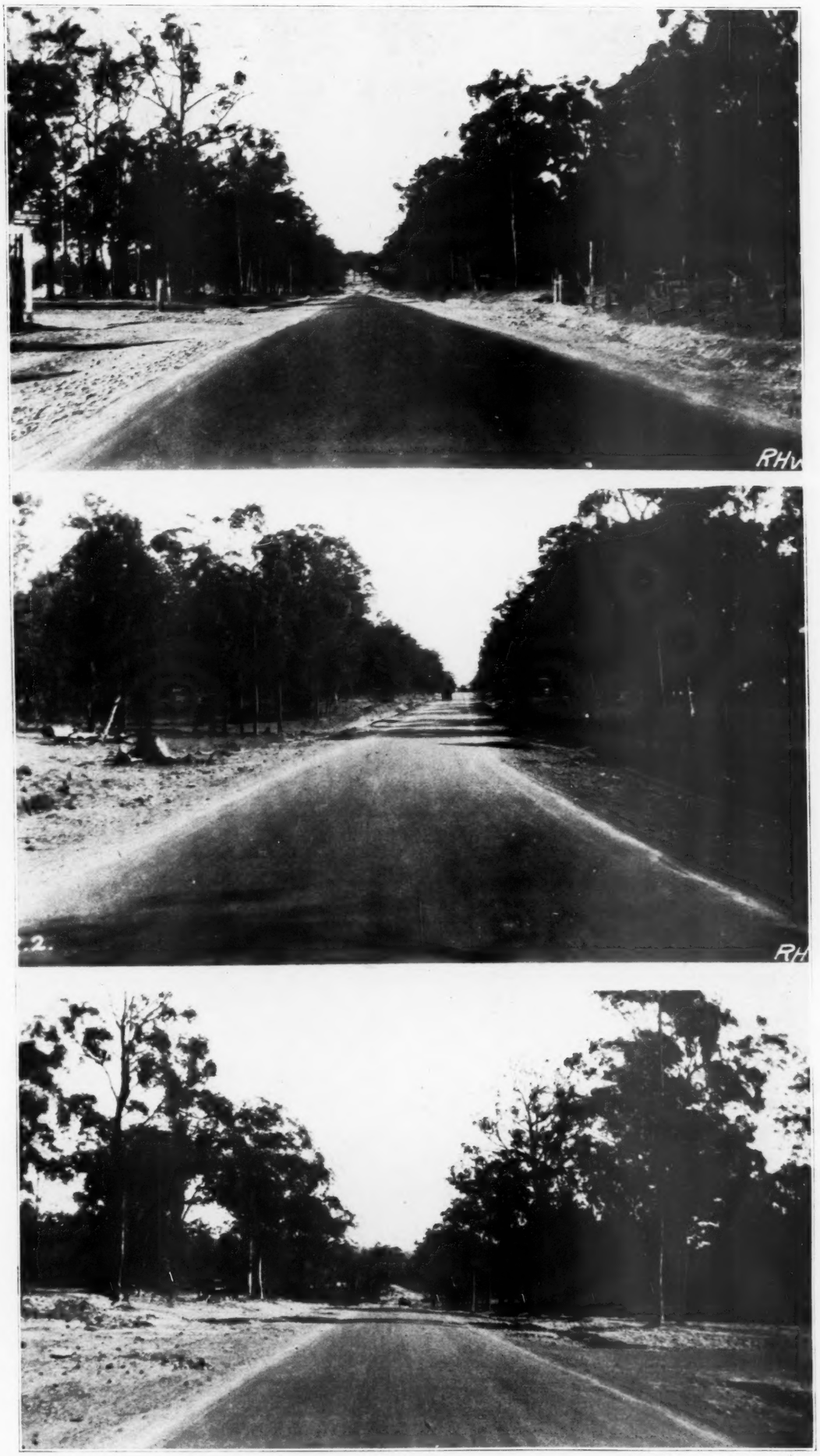
Traffic on the roads of the United States has doubled in less than five years, and in some States it is still increasing at an even more rapid rate. The design of motor vehicles has been so perfected that greater speed can be attained without increasing the hazard so far as the vehicles are concerned. Development of common-carrier busses is still in its infancy.

To care for the ever growing and changing traffic, and to make a wise allotment of available funds, the Federal Government and State highway departments have found that some index of future highway needs is necessary as a working basis. Such an index they acquired in their studies on the flow and growth of highway traffic in various sections of the country. From these studies, future needs are anticipated in reestablishing the location and in planning the structure of highways. Also a more efficient expenditure of funds in possible.

Automobile Population Increases

Automobile increase in the United States amounts to approximately 5 per cent, or 1,125,000 machines yearly, according to the latest figures of the National Automobile Chamber of Commerce. In 46 states gains in auto population running as high as 12 per cent are recorded. In two states losses are shown. New York leads all other states in numerical increase of cars during the past year with 122,484 machines. Pennsylvania's automobiles increased 99,731. California with a gain of 92,720 ranked third. Ohio with 90,488 was fourth, and Illinois with 68,482 fifth. In percentage gain, the leadership goes to North Carolina. Cars increased 12 per cent in that state during the year. South Carolina, Utah and Arizona each added 10 per cent to their auto registration in the same period. New Jersey's machines increased 9 per cent.

Thirty-two states added automobiles at a rate greater than that of the country as a whole, it is found, while fourteen show a percentage of increase less than the U. S. average. In Arkansas a decline of 1 per cent is indicated. In Florida there was a 2 per cent decrease.



Portions of the 20 Miles of Australian Slag Road

REMARKABLE SAFETY RECORD WINS AWARD

By James J. O'Neill

ON OCTOBER 9, at White Haven, Pennsylvania, an impressive ceremony marked the presentation of the Explosives Engineer Award to the member of the National Crushed Stone Association having the lowest accident severity rate in the 1927 National Safety Competition. The winner was the White Haven quarry of the General Crushed Stone Company.

The figures compiled by the United States Bureau of Mines revealed that three National Crushed Stone Association quarries, entered in the National Safety Competition, went through 1927 without a lost time accident. In view of this close competition, the trophy was awarded, in this instance, to the quarry with the most man hours of accident exposure. The official figures of the Bureau showed that the White Haven sandstone quarry had operated a total of 310 days with an aggregate exposure of 159,320 man hours without a lost time accident, 157 days or 5,233 man hours more than the nearest competitor, the rock quarry of the Louisville Cement Company at Speed, Indiana.

Much industry enthusiasm was aroused when it was announced that a quarry of the General Crushed Stone Company had won the coveted trophy, for safety education is an integral part of its operating plan. John Rice, president and Otho M. Graves, vice president and general manager of the company, have always been interested in safety; the latter as president of the National Crushed Stone Association appointed the first committee on Welfare and Safety to function as part of the association, and to investigate conditions and make recommendations to eliminate all hazardous practices that might be found by a country-wide investigation.

N. S. Greensfelder, editor of the Explosive Engineer, presented the award to P. H. Jacoby, superintendent of the winning quarry. In presenting the trophy, Mr. Greensfelder, stressed the value of organized safety education, congratulated the winners on their remarkable safety record and wished them Godspeed in their efforts for the year of 1928.

John Rice, president of the General Crushed Stone Company, in a brief address told how safety education was not only a humane but an economic movement, how by reducing accidents the insur-

Safety Committees of the General Crushed Stone Company. General Committee Standing, Plant Committee Sitting

Plaque Being Presented by N. S. Grensfelder to P. H. Jacoby, Superintendent

ance rates had been lowered, workmen's compensation and accident benefits were reducd to a very low level and how the home life of the workers had reached a high plane heretofore impossible. Otho M. Graves, vice president and general manager, General Crushed Stone Company; H. F. Yotter, insurance supervisor, General Crushed Stone Company; T. J. Quigley, chief, Bureau of Pits and Quarries, Commonwealth of Pennsylvania; and E. S. Chapin, engineer, Independence Bureau, also addressed the assembled men.

The plant safety committee at the White Haven Quarry consists of the following: P. H. Jacoby, superintendent, Elmer P. Wheeler, John J. Parks, William Schaffer, Jr., John Bensch and Edward Kulp. Much credit is due these gentlemen for their accident prevention work.

The General Safety Commission whose duty is

The Explosives Magazine as One Step in Winning the Plaque

to meet, as the occasion demands, for discussing the various problems that arise and to revise the accident prevention work already put into operation consists of the following: Otho M. Graves, vice president and general manager; H. F. Yotter, insurance supervisor; John Rice, Jr., purchasing agent; Barry Rex, amiesite sales manager, and Frank S. Jones, production manager.

World Trade in Diatomite

By virtue of its mode of formation diatomite is one of the most widely distributed of minerals, according to the Minerals Division of the United States Department of Commerce. It is composed of the fossil remains of microscopic marine plants known as "diatoms," which flourish abundantly in both salt and fresh water. The siliceous skeletons are deposited in beds, and found at many places where bodies of water formerly existed; the process of formation is continuous, but the Tertiary period appears to have been the most favorable for the growth and deposition of these plants.

It has many industrial uses, based mainly upon its properties of porosity, and its chemical inertness. These include use as an insulator against heat and sound, a filter aid and filtering medium, a filler in rubber and cement, an inert base for the manufacture of dynamite and an abrasive. The physical characteristics of the material place certain limitations upon its commerce; as it is a very light and porous product it takes a rather high freight rate and does not make a particularly desirable ocean cargo. As a result, many deposits are largely limited in development to the needs of adjacent territory, although the higher grades enter into foreign trade under favorable conditions.

The largest and most important developed deposits are located in California. Algeria comes next in importance as a producer, and supplies a large part of the European demand. Deposits of commercial size occur in most of the European countries. Kenya, East Africa, contains very extensive deposits, but distance from markets renders these of no present value. In several other places in Africa, Oceania, North and South America there are numerous deposits varying in size and present commercial importance.

The United States is the largest producer and consumer of diatomite in the world as the information available indicates that this country absorbs more than two-thirds of the world's total. In comparison with domestic production, imports and exports are very small, indicating that the country is independent of foreign sources for this material.

California furnishes the larger part of the diatomite produced in the United States, but large quantities have also been produced in Oregon and smaller amounts in Nevada, Maryland, New York, Washington, and New Hampshire. In addition there are large deposits in Eastern States that could be developed if economic conditions warranted. Production has been steadily increasing in recent years, the output for 1926 being the highest so far recorded. Later figures are not available.

The Algerian output has gone largely to Europe, although the home country, France, has not been obliged to draw on the colonial resources.

Though Japan does not report imports or exports of diatomite, it probably produces in sufficient quantity to supply domestic needs, with a possible exportable surplus. Diatomite occurs in Hokkaido, Honshu, and Kyushu. The production was omitted from official statistics in 1926, and this product has not been separately classified in foreign trade statistics.

Germany is one of the largest producers and consumers of diatomite in Europe. Development of domestic deposits has been sufficient to meet domestic requirements in the past, although a moderate import and export trade has been carried on. The mineral occurs in considerable quantities in Hanover and Hesse, eastern Saxony, and Anhalt. The extent of the German industry can not be statistically stated, as production is not recorded.

German exports of diatomite in 1927 have been reported at 6,000 tons, while imports for that year amounted to 440 tons. In preceding years the two items were more evenly balanced, imports being 4,300 tons in 1924, 4,700 in 1925, and 7,400 in 1926. These figures form the only statistical information available on the German industry.

World production according to the latest figures obtainable is shown in the following table:

World Production of Diatomite, 1923-1926[1]

(Metric tons)

Country [2]	1923	1924	1925	1926
United States	59,722	57,300	66,251	79,030
Algeria	10,000	[3] 9,092	[3] 8,343	[3] 7,931
Japan	5,319	5,040	4,727	([4])
Germany [3]	4,096	4,326	4,555	5,919
Ireland (North)	1,680	2,480	3,397	3,023
France	4,550	2,300	1,500	([4])
Italy	420	420	420	1,200
Australia (New South Wales)	523	573	712	926
Sweden	696	608	819	475
Union of South Africa	217	236	.....	.....
Norway [3]	110	67	48	([4])
Canada	118	30	.....	.....

[1] Compiled by L. M. Jones, of the Bureau of Mines.
[2] In addition to the countries listed, Spain is reported to have produced tripoli as follows: 869 tons in 1923, 404 in 1924, 868 in 1925, and 804 in 1926.
[3] Exports.
[4] Data not available.

The large variety of forms in which diatomite is marketed makes it impossible to establish an accurate average yearly market price for this product. The records of producers in the United States, however, indicate that the diatomite sold or used had an average value, at the mines, of $11.75 a metric ton in 1923, from which it gradually increased to $13.90 in 1925, and then dropped slightly to $13.70 in 1926.

MODEL SELF-UNLOADING CEMENT BOAT PROVES ADAPTABLE TO MANY CONDITIONS

By W. E. Trauffer

THE Manitowoc Portland Cement Company, Manitowoc, Wisconsin, is operating a bulk cement cargo boat, the "Daniel McCool," which was probably the first to use the Fuller-Kinyon pumping system for unloading. It is also one of the few boats in operation at this time equipped with valve-bag packers for unloading where there are no facilities for storing bulk cement.

The "Daniel McCool" was designed over a year and a half ago by C. C. West, president of the company owning the boat as well as of the Manitowoc Shipbuilding Corporation which built the boat. It is a steel boat 156 feet long, with a 33 foot 9 inch beam, and cargo space for 4,000 barrels of cement and has been operating satisfactorily for more than a year under all sorts of conditions.

The boat is loaded at the Manitowoc plant direct from the storage silos. Collector screws under the silos carry the cement to small hoppers which discharge into two 8 inch Fuller-Kinyon pumps, each direct driven through flexible couplings by a 150 h.p. induction motor. The pumps discharge into two 5 inch pipe lines which carry the cement underground to the wharf, a distance of about 475 feet. The cement comes out of the silos almost red-hot and holds this heat so well that when unloaded, sometimes 12 or 18 hours later, the discharge pipes become so warm that they are almost unbearable to the touch. This heat, however, serves a very important purpose. One of the great drawbacks to handling bulk cement by boat has always been the fact that it will absorb moisture and cake up. The heat in this case prevents any such absorption which might cause difficulties in unloading the cement.

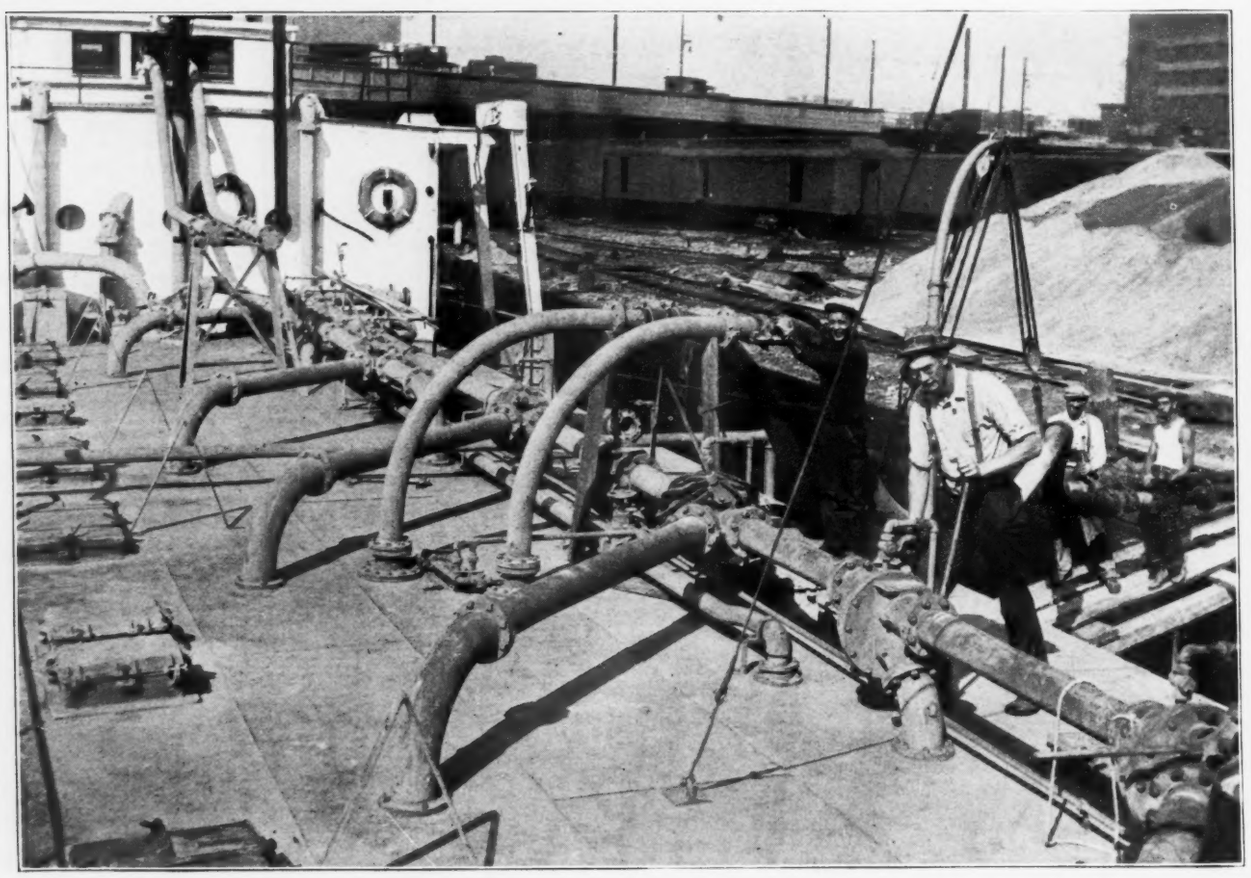
The boat is driven by two 240 h.p. Fairbanks-Morse Diesel engines, each driving a screw direct

View Taken While Boat Was Unloading at Chicago Merchandise Mart. Left to Right—George Allen, Superintendent of Construction; C. A. Welles, General Manager of the Merchandise Mart, and C. C. West, President of the Manitowoc Portland Cement Company. Mr. Allen Is Shown Operating One of the Two Way Valves Controlling Loading of Boat.

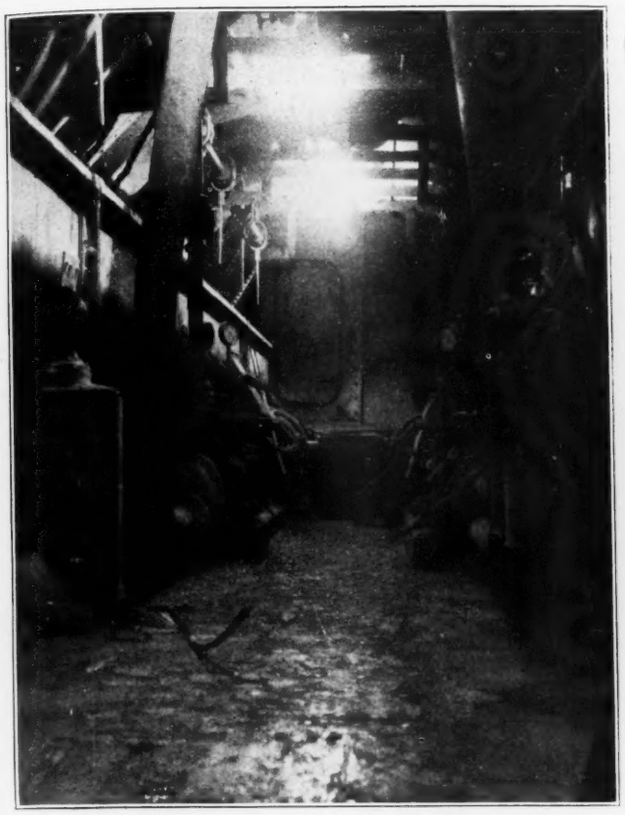
Boat Shown Unloading at Merchandise Mart in Chicago.

through clutch couplings. These engines are also direct connected at their forward ends to two 200 k.v.a. 440 volt a.c. generators, which furnish power for the unloading equipment. When the boat is at the dock the propeller clutch is thrown out and the engines are used solely to drive the generating equipment. Electric current for lights and for excitation is furnished by a 25 h.p. 18 k.w. and a 50 h.p. 36 k.w. generating set, each driven by Fairbanks-Morse Diesel engines. Current from these sets also drives a 25 h.p. fire pump and a 10 h.p. bilge pump and other miscellaneous equipment. Two 100 h.p. G. E. synchronous motors each drive an Ingersoll-Rand 12x14 single stage air compressor operating against a 100 pound pressure. This equipment is all located in the hold just to the rear of the cargo space.

The cargo is stored in two steel bins, each divided into three compartments, running lengthways of the hull. Discharge from these bins is by 16 small screw conveyors on each side, five from each of two compartments and six from the third. These conveyors are chain driven from sprocket wheels on two shafts extending the length of the bins and chain driven at their forward ends. The 16 small conveyors on each side are controlled by individual clutches and discharge into two 14 inch screw conveyors which also extend the full length of the bins, one on each side of the passageway. These conveyors are driven at their forward ends by two 20 h.p. Westinghouse motors through Cleve-



View of Front End of Deck Showing Two Discharge Pipes Being Connected to Shore Lines.



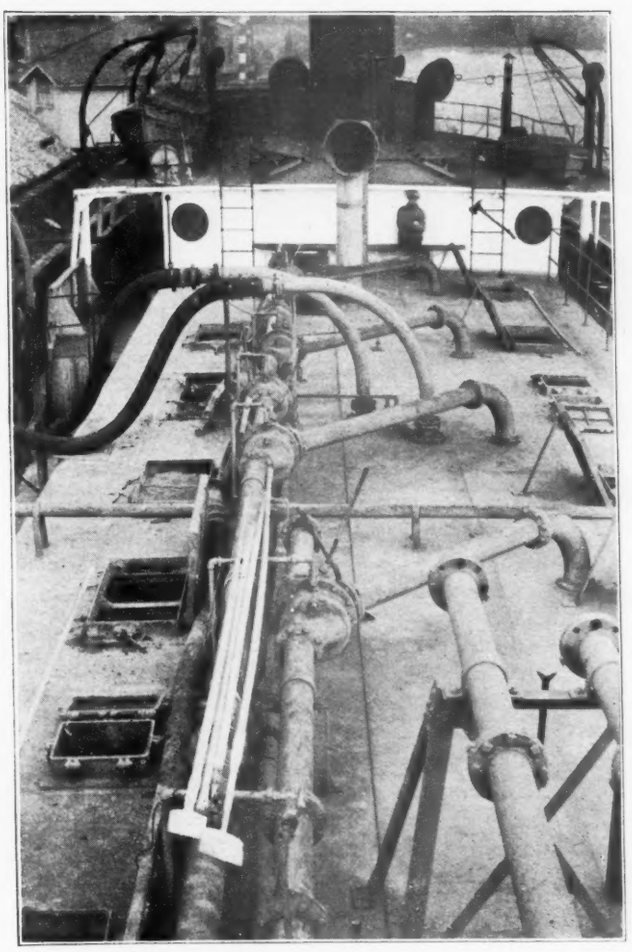
View of Unloading Machinery in After End of Hold

View Showing Conveyor Drives in Forward End of Hold.

land worm gear speed reducers. Sprockets on each of these conveyors drive the shafts operating the feeder conveyors.

The large conveyors carry the cement to the after part of the hold to two 8 inch Fuller-Kinyon Type B pumps on the floor of the conveyor room. Each of these pumps is direct driven by a 75 h.p. induction motor. Compressed air is let into the discharge end of the pump at a pressure of about 80 pounds, the back pressure of the cement in the pipes on shore ordinarily being about 20 pounds. Four separate control boxes allow the speeds of each conveyor and pump to be regulated separately. The pumps discharge into two 5 inch pipes which rise vertically to the deck and have flexible hose connections suspended on a davit for attachment to shore lines.

The two photographs of the interior of the boat show the compact arrangement of the unloading machinery. The view of the after end shows the two Fuller-Kinyon pumps in the background with the air injector pipes and pressure gauges. The two pipes leading from the pumps to the decks and the controllers for the pump motors are in the foreground. The view of the front end of the hold shows the conveyor motors and drives in the background with the controllers in the foreground. Both photographs show the main conveyors on each side of the passageway and above them the driveshafts for the feeder conveyors as well as their individual clutches.



After End of Deck Shown While Boat Was Being Unloaded.

Forward of the conveyor room is a small compartment containing two centrifugal fans which collect the cement dust from the conveyor and pack rooms and feed it to six dust collectors. These are each driven by a 7½ h.p. Westinghouse motor and discharge into two screw conveyors which are each driven through a Cleveland worm gear speed reducer by a Westinghouse 1 h.p. motor and discharge into the two main conveyors at their forward ends.

The deck above the bins is clear except for the hatches and the loading and unloading pipes. The two loading pipes, which are also 5 inch, are fixed and have their inlets at the forward end of the deck. One of these pipes loads the forward compartment on each side, while the other loads the after two. Outlets from the pipes have individual two way valves so that each can be controlled separately. All of the piping and valves are also part of the Fuller-Kinyon equipment.

Forward of the bins and over the dust collecting chamber is the packing room with two Bates three bag packers, each driven by a Westinghouse 15 h.p. motor. The two discharge pipes can be connected by means of the flexible hose to two pipes leading from the forward end of the deck to the bins over the packers. A conveyor takes the loaded bags through a door in the side of the packing room and unloads them on the dock. This equipment will unload from 300 to 400 barrels of cement per hour. The best time to date when unloading direct to bins is 5 hours and 25 minutes and the best loading time at the plant 4 hours and 45 minutes.

Plants for the storage and packing of cement for local trade have been built, one in Chicago on the Chicago river at Fullerton avenue and the other in Milwaukee. Each of these plants consists of two silos with a capacity of about 11,000 barrels each and a packhouse for sacking the cement for local use. At the Chicago yards two additional silos are now under construction which will double the present capacity. Cement is also delivered to material yards along the lake shore, some of these being at Green Bay, Sturgeon Bay, Kewaunee and Racine. In such cases the cement is packed by the equipment previously described and delivered to the warehouses.

The "Daniel McCool" is ideally suited for use where larger boats find it difficult to navigate. Due to its small size and the low deck superstructures it can operate in almost any navigable stream and will clear most fixed bridges. In the Chicago river, for example, where deliveries are made regularly to the Fullerton avenue yards and to the Merchandise Mart, the boat runs up the river at any time under its own power without necessitating lifting of the bridges. As these bridges are only opened during certain fixed hours of the day, this is, of course, a great advantage. A description of the method of handling the cement at the Merchandise Mart, which will be the largest building in the world in floor space as well as one of the highest, was published in the September 26 issue of Pit and Quarry.

Australian Construction Notes

Notes on construction projects in Australia received from Assistant Trade Commissioner Charles F. Baldwin, Sydney, including the following: A £100,000 building (including machinery equipment), Strathfield (Sydney); a large brick factory, Glebe (Sydney); rebuilding of business premises to cost £300,000, a £500,000 bank building, a £600,000 theater, and a modern Turkish-bath building, Sydney; a motion-picture theater with seating capacity of 2,500, Brisbane; a new brick theater, Bundaberg, Queensland; and additions to business premises, Goulburn, New South Wales.

The Federal Development and Migration Commission of Australia has recommended the construction of the Ejanding (Western Australia) railway, as a developmental scheme to be undertaken under the £34,000,000 agreement (see Construction News for July 2, 1928), according to Assistant Trade Commissioner Charles F. Baldwin, Sydney. The scheme has the approval of the Commonwealth and British Governments. The estimated cost of the project is £400,000, and it is expected that the enterprise will begin without delay.

Construction Projects in Canada

Construction work planned in Canada, as reported by Assistant Trade Commissioner L. A. France, Montreal, includes the following projects: A grain elevator, St. John, New Brunswick; a $1,500,000 bank building and a $750,000 central heating plant, Vancouver; alterations and additions to power lines, Walkerton; a hotel of 200 rooms, London, Ontario; a $300,000 apartment house, Edmonton. Contract awards include the following: A $200,000 marine railroad, Lauzon, Quebec; a $900,000 cold-storage plant, New Westminster, British Columbia; a $600,000 superstructure to a sanitarium, Prince Albert, Saskatchewan; a $300,000 hospital, St. Hyacinthe; a $150,000 manufacturing and office building, Hamilton, Ontario; a $850,000 apartment house, and a $750,000 building, Montreal; and retaining dams to cost approximately $899,000, Ottawa.

Six projects for the erection of schools in various parts of Canada are reported by the Assistant Trade Commissioner of Montreal.

WIRE ROPE AND SAFETY

By D. F. McMurchy*
Structural Engineer, Industrial Commission of Ohio, Columbus, O.

IT is my pleasure, gentlemen, to give you a few observations upon the use and abuse of wire rope from the standpoint of an engineer with a state safety department. This item of equipment has done more to facilitate the construction of our larger structures than any other in that it made possible the power equipment used in excavation, erection and transmission without which our construction operations would be seriously hampered. Its ability to withstand abuse, combined with its great strength and flexibility, recommend wire rope for the severe service required of such equipment on construction work, and it has been my experience that the majority of wire rope failures are not the fault of the rope but are due to improper care, use and connections.

If we consider for a moment the construction of wire rope we immediately sense its limitations. As the name implies it is rope made of wire. The construction most familiar on building operations being 6 x 19, that is, 6 strands of 19 wires each twisted around a hemp center to form a rope. Three grades of wire are most commonly used in its manufacture—iron, crucible steel and plow steel. The latter two, because of their combined strength and flexibility, are generally used on construction operations as rigging for hoisting, transmission and excavating equipment. Frequently cables that have been removed from this equipment are again placed in service as guys on towers and derricks and as lashings, slings, etc. Other constructions are manufactured to serve various purposes requiring greater strength or flexibility, but the 6 x 19 construction more nearly satisfies the contractor's requirements. Being made of wire it is not as flexible as hemp rope and cannot be bent sharply without seriously affecting its strength.

The contractor in ordering rope has to rely almost entirely upon the integrity of the supply dealer in the matter of getting the rope specified. Few workmen can tell by the appearance or feel of a rope whether it is iron, crucible or plow steel. Like Chinamen, they all look alike but their strengths vary considerably, iron rope having about 40 per cent and crucible cast steel about 85 per cent of the strength of a plow steel rope of the same diameter. Iron rope when bent with the hands does not have the tendency to spring back that crucible or plow steel rope have and may be detected in this manner, but the difference in spring between the crucible and plow is hardly perceptible and the test is not sufficiently reliable to determine the quality of the rope.

To overcome this uncertainty, the proposition of weaving into the hemp core a narrow tape containing information as to the material, strength and manufacture has been advocated by several speakers and writers on the subject, and I am informed that one manufacturer is labeling his rope in this manner. For the benefit of the manufacturer, dealer, consumer, and public such procedure should be followed by all wire rope manufacturers, thus removing the uncertainty of using a rope of less than is required.

Three major factors govern the life and strength of wire rope, external wear, internal wear and kinking. A new rope being circular in section, presents only the surface of one or two wires of each strand at any section to external wear against the sheaves and other objects with which it comes in contact. Abrasion against the sheaves augmented by gritty substances contained in the dust and mud ever present around construction operations, tend to wear these outside wires very quickly, reducing their sectional area. As the process continues the next adjacent wires begin to wear but rarely more than three wires of any strand present a wearing surface to the sheave before one wire breaks. This failure increases the load on the other wires and with their decreased sectional area they fail rapidly.

As a means of reducing external wear on rope it is essential that the sheaves be properly aligned and that the grooves of the sheaves are kept in good condition. Sheaves with broken flanges or that have oversize bores, not only increase the wear on the cable but also the hazard of the line jumping the sheaves which often produces disastrous results. Running lines should be clear and well lubricated and should not be allowed to wear against any material which will tend to abrade them. The question of the use of hard or soft sheaves depends upon existing conditions. In some instances it is more economical to replace the sheave than the line; in others the opposite is true. A rope should be replaced according to the Bureau of Mines when the diameter of the outside wires has been worn to 65 per cent of their original diameter or if 6 broken wires appear in one twist or lay of 6 x 19 rope. It is recommended that rope be discarded if five wires are broken with 10 per cent wear on outside wires; four wires are broken with 20 per cent wear on outside wires and three wires are broken with 30 per cent wear on outside wires.

Another factor affecting the life of wire rope in service is internal wear. Being flexible there is considerable internal motion in the rope as it

* Presented before the National Safety Congress.

changes direction under load as when passing over sheaves. The outside wires of the rope passing over a sheave are stretched more than the ones adjacent to the sheave. This unequal stretching produces internal motion within the rope which unless thoroughly lubricated tends to wear the rope from within. Where the rope is subjected to reverse bends as in the case of the load line on a derrick passing from the hoist engine under a sheave at the bottom of the mast and over a sheave a short distance up the mast, this stretching shifts from one side of the rope to the other, increasing the internal motion and consequently the internal wear. It follows that the smaller the sheave, the greater the stretch in the outside wires. Wire rope manufacturers recommend sheaves of a diameter in feet equal to 4 times the rope diameter in inches for crucible steel or plow steel rope.

Internal wear can be materially reduced by proper lubrication and the use of larger sheaves. The latter is not always possible, being limited by the design of the equipment, but larger sheaves will pay their added cost in increased rope life where conditions permit their use. The value of lubrication cannot be stressed too strongly and the additional cost of lubricating them is negligible when compared with the increased life resulting. Proper lubrication will minimize the breaking of interior wires which weaken the rope and which cannot be detected by casual inspection.

A third major factor is kinking. To sever a wire without the services of wire cutters, we kink it and it breaks easily. Kinking has the same effect upon wire rope, it being nothing more than a twisted bundle of wires. We know also by experience that the harder the steel the more brittle it becomes, having broken soft iron or copper wire in one instance and steel piano wire in the other, the latter breaking with much less kinking than the former.

Kinking is probably the most destructive of the three major causes of wire rope failure as little warning is given of the weakened condition. Great care should be exercised in taking wire rope from the reel to avoid kinks. It is a good plan either to roll the reel along the ground or floor or to mount the reel on a bar and run the rope off as needed. When wire rope is taken from a coil—roll the coil along the ground rather than to pull it from the coil laying flat. Wire lines are frequently snarled when a clam shell turns over or a load slips. Such occurrences very often produce kinks and sometimes snags. Snarled lines should be straightened very carefully and inspected for snags or cuts before subjecting them to loads.

There are other factors affecting the strength of wire rope such as unlaying of strands due to lack of sizing, corrosion from various causes, fatigue and others, but the majority of failures in wire rope are traceable to the three major causes given above providing of course that the proper kind and construction of rope was selected for the work in hand.

At this point, I would like to say a few words about connections. Of the various connections manufactured the clip is used more frequently than any other type on construction work. Its cost, ease of application, efficiency and adaptability are responsible for its extensive use in preference to other types with greater efficiency such as leaded sockers or wedge socket connections. Clip connections can develop efficiencies of better than 80 per cent when properly applied but connections of this strength are rarely found. Many riggers prefer to stagger clips on clip and thimble connections for no other reason than that they have always made such connections in that manner. The "U" bolt when drawn too tight, as they frequently are, crush the wire line at the point of application—kinking the strands at that point. If the "U" bolts are placed on the free end of the line, the friction around the thimble reduces the load on the line at the clip, thus offsetting in a measure the decreased strength due to the crushing effect of the bolt. When applied in the opposite manner, the full load is subjected to the weakened section directly under the bolt. Better connections are made by using more clips rather than to apply a few in such a manner that the rope is crushed. Clip connections on new lines should be watched very carefully until the line takes its stretch. As the strands adjust themselves under load and compress, the hemp center, the rope decreases in diameter, thus loosening the clips. The contractor's standby, much maligned by safety men as being dangerous, is far more efficient and dependable than some clip connections commonly found on construction work. While the half hitch kinks the line and reduces its strength probably 50 per cent the connection is dependable up to this limit even when applied in a relatively careless manner, and the load on the line rarely reaches 50 per cent of its ultimate strength. The wedge socket has some advantages over other connections in efficiency and ease of application but is more expensive and does not have the adaptability of the clip.

Accidents in which wire rope is a factor are not limited to those caused by the failure of the line itself. Our records show that accidents due to wire rope failures are quite infrequent, there being only one in the construction industry this year. In this case a boom line on a derrick parted and two men were struck by the falling boom. There are others, however, in which wire rope is a factor but not the cause of the accident. Just recently a laborer on an operation in Cincinnati was killed when a splice in a hoist line made with one clip failed, allowing the platform of the inclined hoist

(*Continued on page* 60)

MORE ABOUT QUARRY PRACTICES

A RECENT issue of the DuPont Magazine contained an article on quarry practice by S. R. Russell, explosives expert for the DuPont Powder Company. This article, which describes the use of shovels, drills, and the snakehole and coyote tunnel methods of blasting, is a supplement to the one discussed in the October 10 issue of Pit and Quarry.

The caterpillar tank developed during the World War was responsible for the mounting of power shovels on crawlers or caterpillars. This was one of the greatest advances in excavating machinery in recent times and made possible new methods of quarry operation. The use of rail sections was eliminated as well as the two or three men needed to move these sections. Time required to move the shovel became a minor factor and due to its flexibility, the crawler equipped shovel can keep its nose in the bank regardless of whether a low or high face is used.

The well drill formerly dominated the field for sinking blast holes because drills of the tripod type were suitable only for low faces. During recent years, however, a self rotating hammer drill using 1¼ inch steel has been developed which will make a two inch hole. These drills can also be mounted on wagons or derricks. The steel need be changed only every 8 or 12 feet and as much as 40 feet of hole per hour can be drilled in limestone. The holes are usually drilled dry, but a water jet can be used where needed.

Mr. Russell believes that this type of drill is more efficient than the well drill where the depth of hole required is 32 feet or less. Closer spacing between holes is of course necessary, but the holes can be loaded higher with explosives and several rows can be shot at one time, giving better distribution of explosives and better fragmentation. This results in less secondary shooting, greater shovel output, and lower operating and production costs. This is especially true on low faces because in shallow well drill holes it is impossible to get proper distribution of the explosive and still keep the blasting cost within reason.

In some limestone quarries where the stratification is irregular and where it is almost impossible to maintain regular benches the snakehole method of blasting is often employed. This is true of trap and other igneous rock where drilling costs are unusually high. Although not used as much as formerly this method is sometimes necessary in any quarry to remove a heavy toe or to help pull bottom where well drills are used.

Snakeholes up to 30 feet in depth are common and a rock face of from 50 to 80 feet can be worked successfully with one row of snakeholes. Gelatin dynamite for springing shots gives the best results, especially in hard trap rocks, while the chamber can be loaded with either gelatin or ammonia-type dynamite. Where this method is used exclusively, however, the quarry face must be long enough so that part of it can be drilled while stone is being removed from the remainder. This is due to the fact that all stone must be cleaned up before holes can be started for a new blast.

The holes should be started three or four feet above the quarry floor level and allowed to dip so that at the point they will be at or just above the level of the floor. This is important because if the hole is started too low the point may be several feet below the quarry floor and after springing will be still lower. The holes should also be given sufficient time to cool after each springing charge is exploded and before another is loaded. Cooling of the chambers can be hastened by blowing in compressed air or water. The temperature can be tested by a thermometer tied on a stick or by feeling the tamping pole after it has remained in the hole for a few minutes. To prevent excessive raveling of the hole tamping should be used after the first springing shot.

The coyote or tunnel method of blasting has recently come into favor, especially in trap rock quarries in the East. This method consists of driving a small drift or tunnel at the bottom of and at right angles to the quarry face with cross headings at intervals to the right and left. These tunnels are usually about 3½ by 4 feet in section. In the opinion of Mr. Russell this method is particularly suited to the trap rocks of New England and eastern Pennsylvania where well drilling would be too expensive, running from $3.00 to $7.00 per foot.

These tunnels cost about $6.00 per foot to drive but in a high face are much more to be depended upon to pull the bottoms than well-drill holes. For faces under 70 feet the tunnel method is probably not economical but when the face is from 125 to 150 feet in height this system will work nicely. For faces of even greater height it is best to use a combination of well drills and tunnels, placing the holes part way the height of the face and directly over or just behind the tunnels.

The tunnels are usually driven in the form of a "T" and may have one or more crossheadings, depending on the overburden. Where more than one crossheading is used the back wings should be loaded heavier than the front. When the face is from 90 to 125 feet high with a single "T" tunnel a 40 to 50 foot horizontal burden can be taken. The wings can be as long as desired but 75 to 80 feet is about the limit for convenience and economy in mucking and loading. Heavy loading is advisable so that the stone is well thrown out to avoid

banks on the last cuts of the shovel. The usual load is about four to five tons to the pound of 40 per cent dynamite, neat line measurements.

The tunnel method is more applicable to hard rocks than to limestone formations. Limestone breaks bigger and may have many faults and caves besides drilling easier, so well drills are better, except in emergency. The explosive units in loading tunnels may vary from a few hundred to several thousand pounds each. Mr. Russell recommends using large sized cartridges and removing them from the boxes. They can be stocked or piled up like cordwood at intervals of 15 or 20 feet along the wings of the tunnels, no explosives being placed in the adits.

The usual method is to stem the spaces between the explosive units with sand, fine stone or muck taken from the tunnels. The adit, of course, is filled with stemming for at least 75 per cent of its length. The work of placing this stemming in the wings is slow and tedious. Mr. Russell had for some time thought that this intermediate stemming could be dispensed with but never had a chance to try it until the past summer. In arriving at the idea he assumed a tunnel system with a 50 foot adit and 50 foot wings, with an average section 4 feet by 4 feet, the total volume of air in the wings being 1,600 cubic feet. Assuming a charge of 12,000 pounds of Red Cross Extra to pull the burden, this would produce about 100,000 cubic feet of explosive gases. This amount of explosives in 5 by 16 inch cartridges would occupy 180 cubic feet.

In loading tunnels the space across the intersection between the last charges placed in each wing is stemmed and from there out toward the portal. This space is about 15 feet long, or 240 cubic feet, making 420 cubic feet of free air. An excess of explosive gases to counterbalance this volume would only require about 125 additional pounds of explosive, a negligible amount when the time, effort and expense of placing the stemming is taken into consideration. The difference is actually even less than that, because with rock stemming the voids are probably as much as 30 per cent. Results from six tunnels shot in this way with no stemming between units in the wings were very satisfactory and proved, in Mr. Russell's opinion, that stemming between explosive units in tunnels of normal section can be omitted with equally good results.

Mr. Russell at one time favored powders of the Judson type for tunnel blasting, but has come to believe that dynamites give much better results in hard rocks. He believes that, as a rule, it is better to use high-strength explosives in hard rock, no matter what method of blasting is employed. More trouble and complaints arise from poor or unsatisfactory breakage than from any other thing. It is necessary to get maximum fragmentation in the primary blasting in most quarries so that secondary treatment is reduced to a minimum. The blasting affects every subsequent operation, such as loading, hauling, crushing, and the like. If stone is not properly broken, the result is felt all along the line and the cost of production is increased.

(*Continued from page* 58)

to run to the bottom of the incline, crushing the workman against a pile of lumber. Two workmen were electrocuted in Akron when the lines of an excavating machine came in contact with a high tension wire. A workman received a fractured skull when a hook pulled off of a lug on a section of steel stack which was being moved along the floor by means of a winch. He was standing about 20 feet from the stack and about 3 feet from the line when the hook snapped back and struck him in the head. We receive numerous reports of lacerations and falls caused by men running into moving lines placed near the floor and not infrequently reports of mangled hands and arms which have been drawn into snatch blocks and sheaves located within reach of workmen.

Accidents of this kind are of sufficient frequency and severity to warrant the constant attention of the safety engineer on construction operations. Some of our contractors put their sheaves up out of reach and provide barriers for all running lines near the floor or ground as a means of preventing accidents from this source. In my opinion, rules of standard practice governing the use and care of wire rope and the various types of connections should be made available to every user of wire rope as a means of increasing the life and safety of wire rope and of reducing the number of accidents in which it is a factor.

Gasoline Tax Increased in Province of Quebec

The Quebec Legislature last session passed a law increasing the provincial tax to 5 cents per imperial gallon; the tax formerly stood at 3 cents, according to a report from Assistant Trade Commissioner L. A. France, Montreal. There have been many complaints by motorists through the province as a result of this measure, but Government officials strongly justify its passage from the standpoint of necessity of maintaining roads throughout the province from revenue obtained in this way. The Province of Quebec maintains a mileage nearly equal to that of Ontario, where automobile registrations are about four times as large. Ontario has been realizing about $10,000,000 in motor taxation, as compared with $5,000,000 in Quebec, and has recently increased its tax to 5 cents a gallon. The Quebec government has recently taken over the entire cost of maintenance.

GRAPHIC DETERMINATION OF COSTS

By J. J. Berliner

THE proper control of manufacturing expense can be best attained through a comprehensive system of statistics which, when compiled at periodic intervals will reflect the true conditions either of the factory, as a whole, or of any part thereof. There is probably nothing equal to the graphic chart for showing costs, whether it be for the purpose of studying the fluctuations of cost of operating a machine, a department, or an entire business, or whether it is to compare actual cost of performance with some predetermined standard.

By plotting the units of time, money, volume of output, etc., on cross section (graph) paper, a much better comparison can be made than is possible where the information is contained in numerous typewritten reports embodying a mass of figures. The matter of compilation of cost reports for the executive has always been a problem presenting difficulties as to the manner in which they should be set forth, so that important information will be conveyed quickly and with sufficient emphasis, and the unimportant points given less prominence. Graphic charts show up the variation and fluctuations of costs as nothing else can and furnish a basis for analysis and study which it would be difficult, if not impossible to obtain in any other way.

There is almost no limit to the use of charts in this connection and it is safe to say that the use of graphic charts for the study and analysis of costs will be universal.

Costs are almost always figures on some sort of unit of production such as pounds, feet, gallons, number of items produced, etc. In many cases, where these unit costs do not run higher 3, 4, 5, 6, 8, 9, or 10c units, a variation of half or three-quarters of a cent appears too small to command much attention, yet a half cent represents an increase of 5 per cent on a 10c article, or 10 per cent on a 5c article. If a business is earning 10 per cent, such an increase of cost on a 10c article will eat up 50 per cent of the profit, and in the case of the 5c article will consume the entire profit. One method of endeavoring to emphasize the full significance of variations of this kind, apparently small, which really represent large comparative variations in low priced goods, has been to present figures covering 100 units instead of only one unit, but even in doing this, a figure showing a cost of $10.50 for 100 articles which are expected to cost but $10, is not enough different to invite any great concern on the part of the responsible executive, who is perhaps under pressure requiring more immediate action in some other direction.

Such figures do not command attention in proportions of their importance to a business. The aim and purpose of all reports, including costs, is to present the salient points of the story of the operations of a business in a manner to conserve the time of the busy executive, and charts provide the means of recording costs in a way which will show each half-cent or quarter-cent as great or as small as its importance to the figures to which it is related. In making this representative on a chart each unit of variation in cost, up or down, is fixed at a measure of distance which will give to the observer whatever impression of the change is considered necessary to command attention in proportion to the importance of the fluctuation represented. For example, if a fluctuation of one-quarter of a cent is of just as vital importance, in the cost or selling price of one article, as one cent is in the price of some other article, the chart may be so planned that the upward or downward trend represented by the quarter of a cent will be one inch, while in the case of the other fluctuations of equal importance, the measure of this one cent fluctuation may also be set at one inch, thus bring-

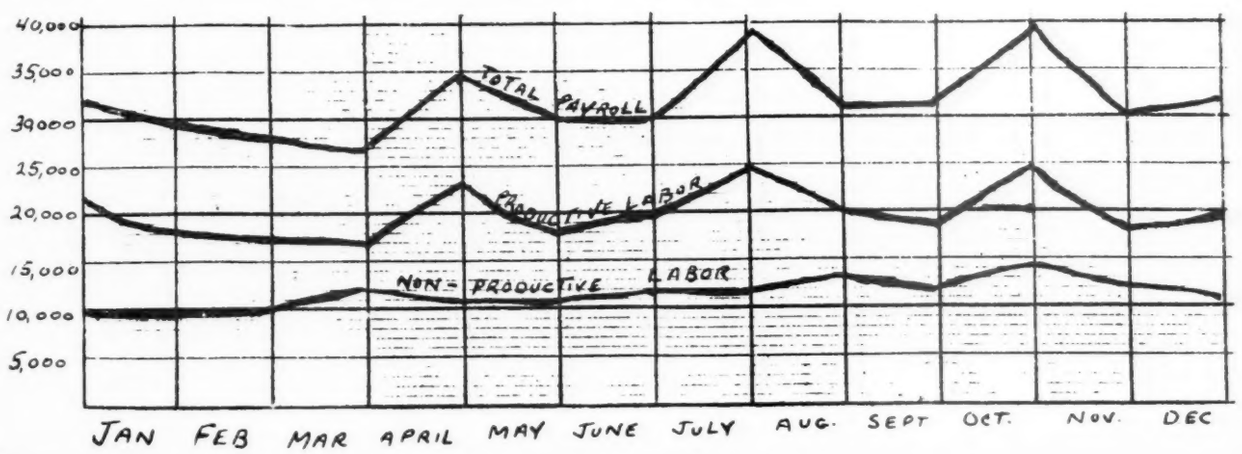


Chart 1—Comparison of Payroll, Analyzed by Productive and Nonproductive Labor

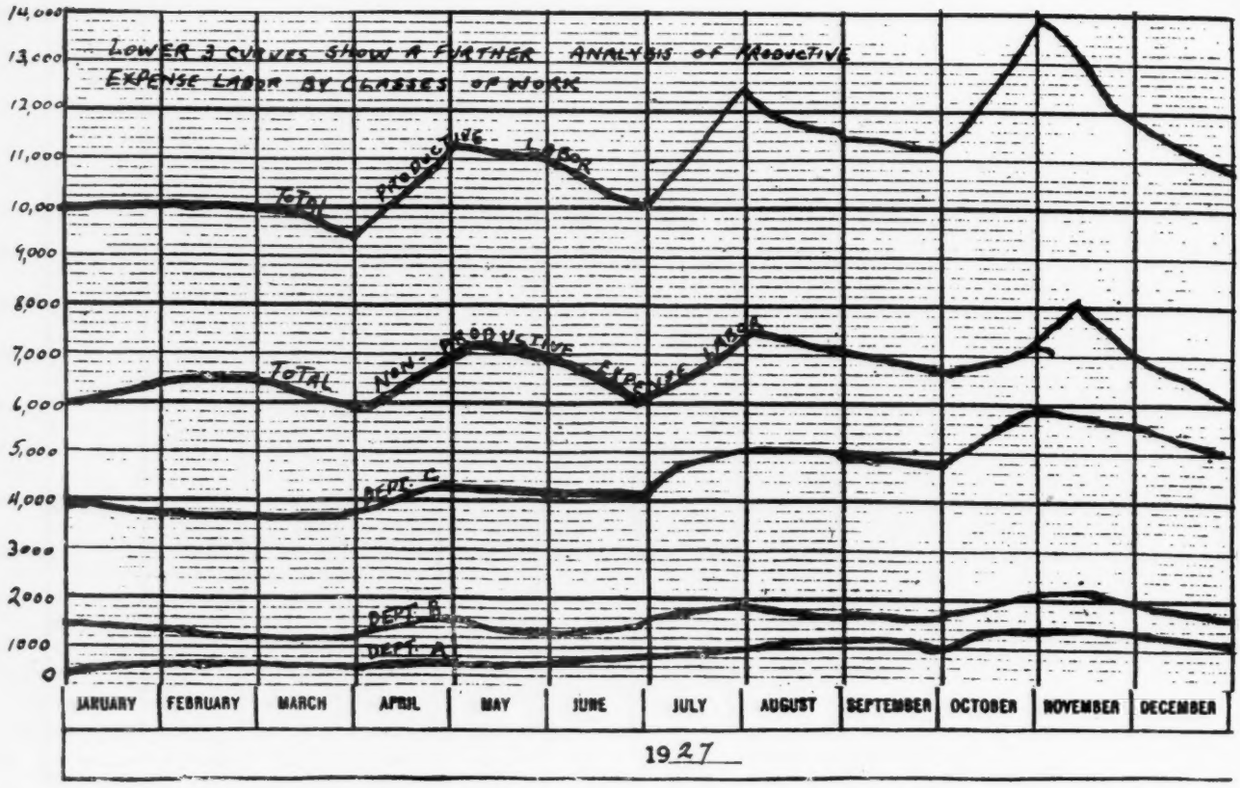


Chart 2—Graphic Analysis of Nonproductive Labor into Nonproductive Expense Labor and Productive Expense Labor

ing them on a parity and eliminating the necessity for mental process of comparison. This illustrates the adaptability and elasticity of charts as compared with figures.

Charts covering costs lead the observer out of the maze and fog of figures and show a line, or two lines, or three lines, leading up or down according to whether the trend of the costs is upward or downward. The terms "uphill" and "downhill" are of common usage in expressing the condition of a business, and charts are planned so that they show the hills and valleys of a business and are comparable to standing out in the open and looking at the horizon. Perspective is there, and a broad,

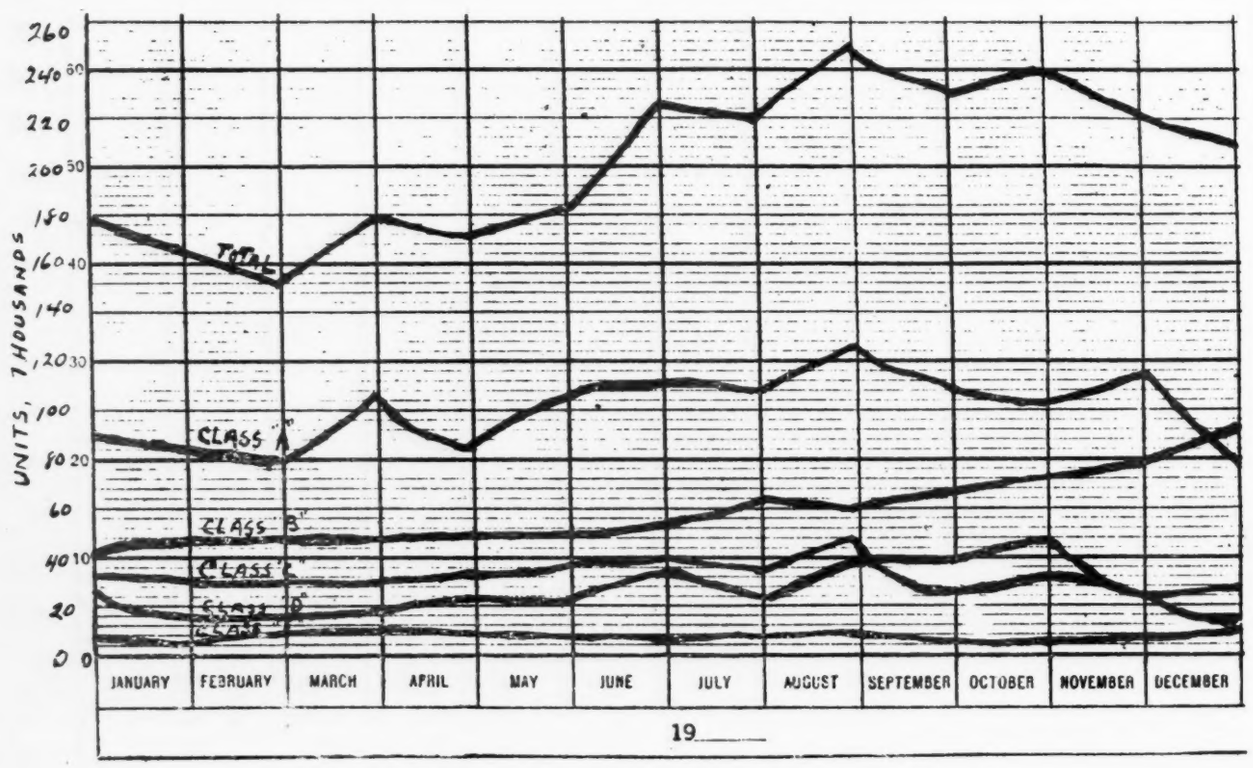


Chart 3—Comparison of Units of Output by Classes of Materials

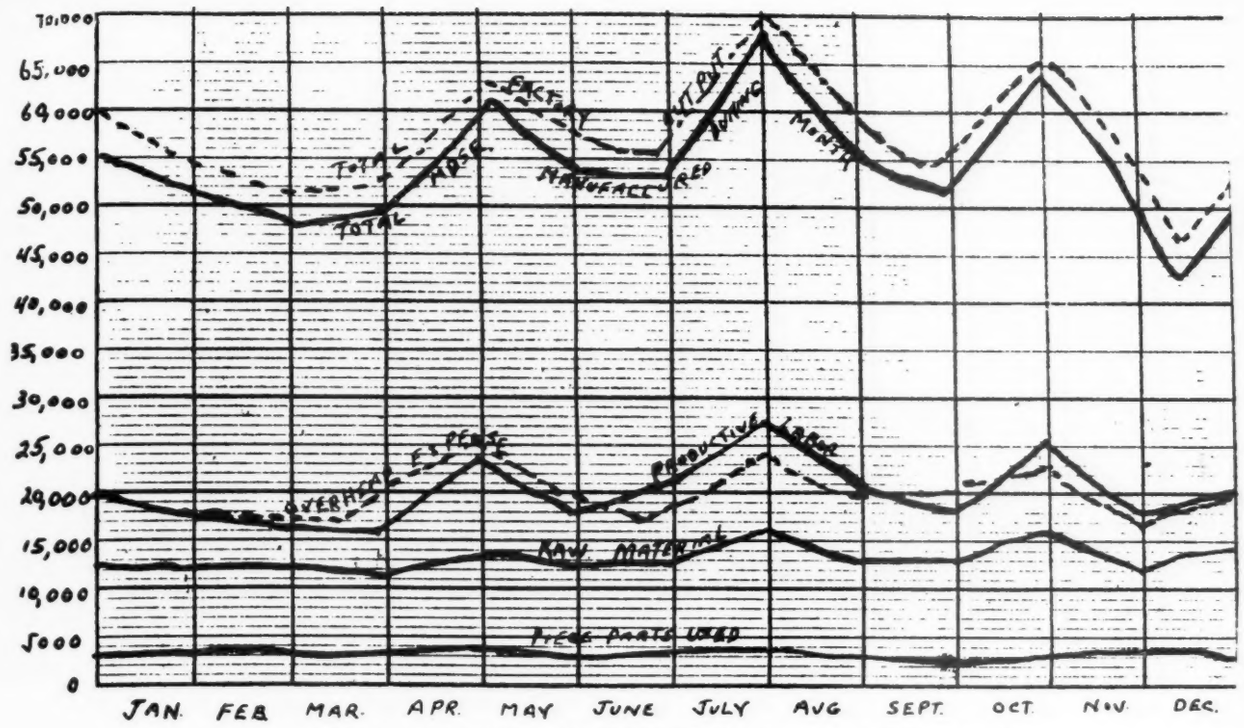


Chart 4—Comparison of Manufactured Material to the Total of Output

clear view with sharp lines of demarcation, showing the commanding "peaks." This result is obtained merely by the position of the various points on the chart, making it unnecessary even to look at the figures to determine whether a specific figure is a "3" or a "4" or an "8" or a "9." The points on the chart exhibit this, by the angle of the line, without necessitating the mental process of considering whether a figure is greater or less than another. These lines which form the "horizon" so to speak, run either up or down, indicating increase or decrease—greater or smaller costs.

Costs usually made up of three major elements, are of special interest as to how these elements combine into a total cost, and the lines of these three elements, material, labor, and overhead, should be charted with the total costs, thus correlating each of them with the total cost and with one another.

From the standpoint of manufacturing expense analysis, probably the first of these charts should show a comparison of the factory or shop payroll as segregated into productive and nonproductive. Let us assume that the average monthly payroll in one factory amounts to $30,000, divided into approximately $20,000 for productive labor and $10,000, for nonproductive labor. Chart 1 is an illustration of a graphic chart showing the variations of labor costs.

An examination of Chart 1 will show in the month of January, for example, that with a productive labor payroll of $21,500, the nonproductive labor for the same period was $10,000. In the month of March, with the productive labor having dropped to $17,000 or a loss of $4,500 as compared with the month of January, the nonproductive has risen to $12,000, a gain of $2,000 over January.

Again we find that at the end of the year for the month of December the productive labor was $20,000 or $1,500 less than in the month of January of the same year; while the nonproductive labor has increased from $10,000 to $11,000 for the same period. This increase would tend to show carelessness in controlling nonproductive labor, which is a part of the manufacturing expense.

Assuming, therefore, that the chart showed that nonproductive had increased while the productive labor decreased, a further analysis of the nonproductive labor would be in order, the object being to allocate this nonproductive labor in order to find out just what part of it was responsible for the increase.

Chart 2 shows at the top of the sheet the total nonproductive labor on a somewhat larger scale than on Chart 1. All nonproductive labor can be divided into the purely nonproductive expense labor and into what is called productive expense labor. Chart 2 therefore, shows first the total nonproductive labor as divided between nonproductive expense labor and productive expense labor, and then further segregates this production expense labor into departments.

Chart 3 shows the number of units turned out from month to month. The total is then further segregated into the different classes of goods as represented classes A, B, C, D, and E on the chart. An examination of this chart will show, for example, that the greatest increase has been in class

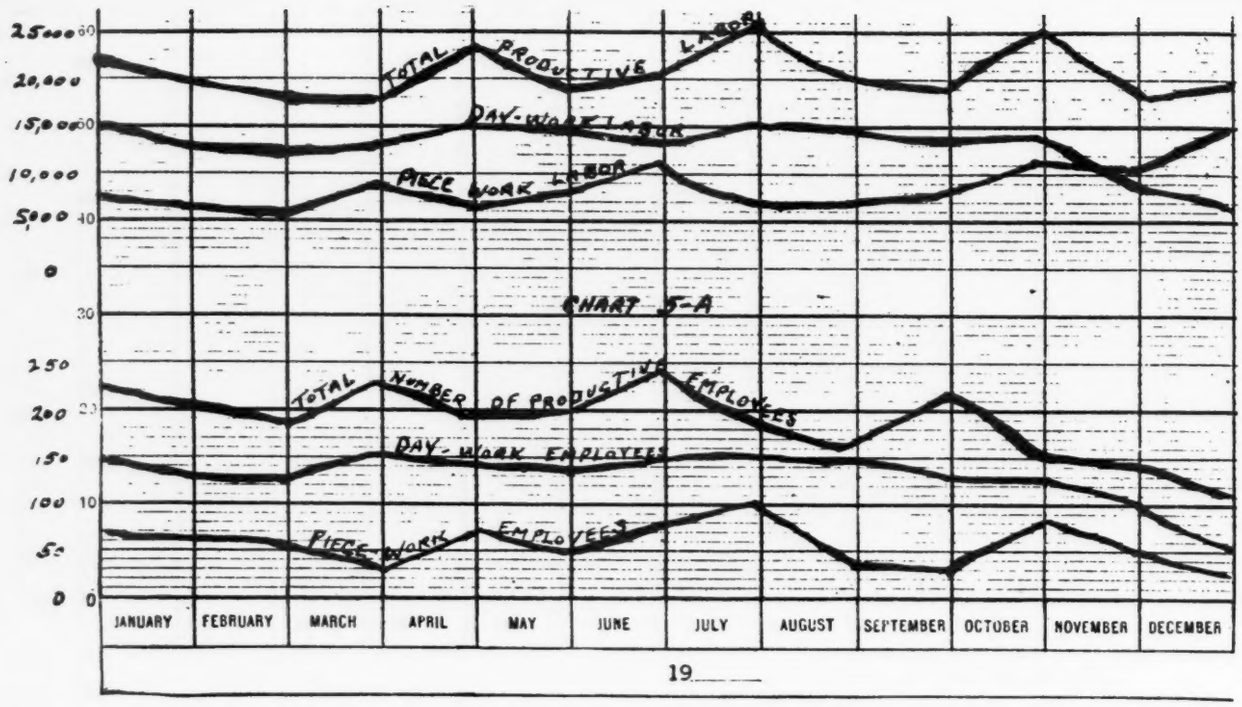


Chart 5—Comparison of Day Work and Piece Work to Total Productive Wages and Comparison of Day Work and Piece Work to Total Productive Employees

"B" goods, which shows a constant increase from month to month, while other classes of goods are fluctuating quite widely or maintaining practically a uniform output. The value of such a chart is that by its use executive control may be centered either on those lines which are falling off in production, or on others that may show too much of an increase—an increase which might possibly have a disastrous effect on other remunerative classes of output.

Chart 4 is a comparison of goods manufactured to total output. The cost of any article manufactured is made up of the raw material, productive labor and manufacturing expense chargeable thereto. The sum of these three would be the cost of goods manufactured, but it would not reflect the cost of the goods when completed, finished and delivered to be sold. This is due to the fact that in most plants, a certain number of parts are purchased from outside sources and are assembled with the goods manufactured. It is therefore necessary to show the amount of such piece parts during any month in order to arrive at the total cost of the manufactured product.

Chart 5 shows in a very comprehensive manner, first, an analysis of the productive labor payroll

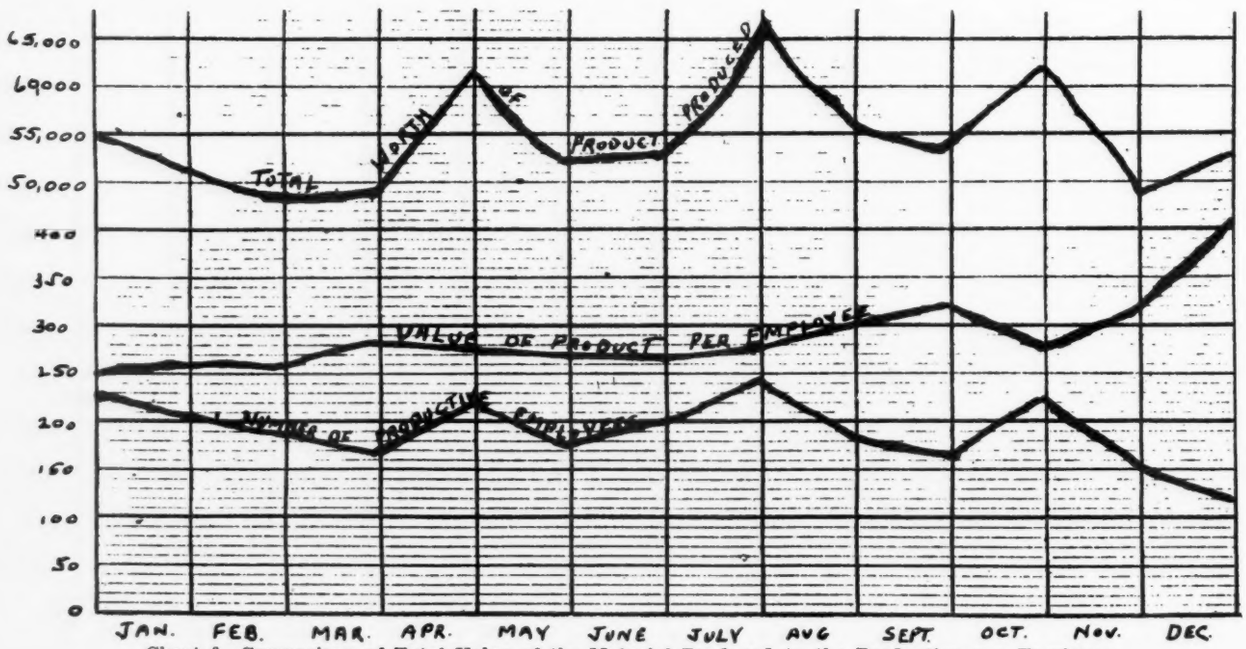

TOTAL VALUE OF PRODUCT PRODUCED
VALUE OF PRODUCT PER EMPLOYEE
NUMBER OF PRODUCTIVE EMPLOYEES
JAN. FEB. MAR. APR. MAY JUNE JULY AUG SEPT. OCT. NOV. DEC.

Chart 6—Comparison of Total Value of the Material Produced to the Production per Employee

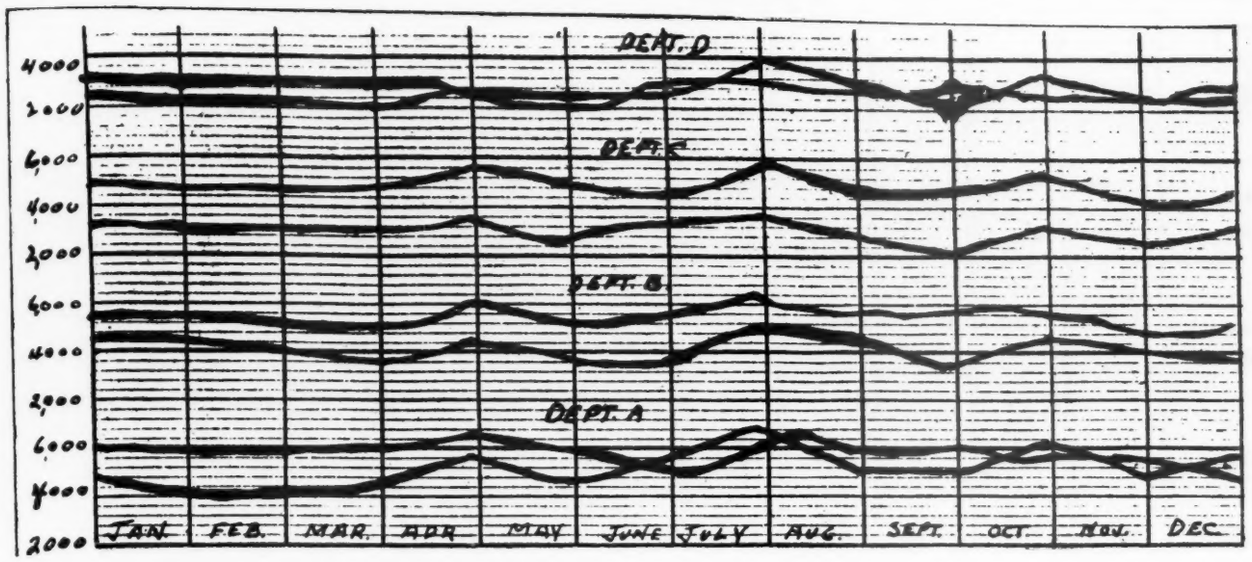


Chart 8—Departmental Comparison of Overhead Expense to Productive Labor at the Same Periods

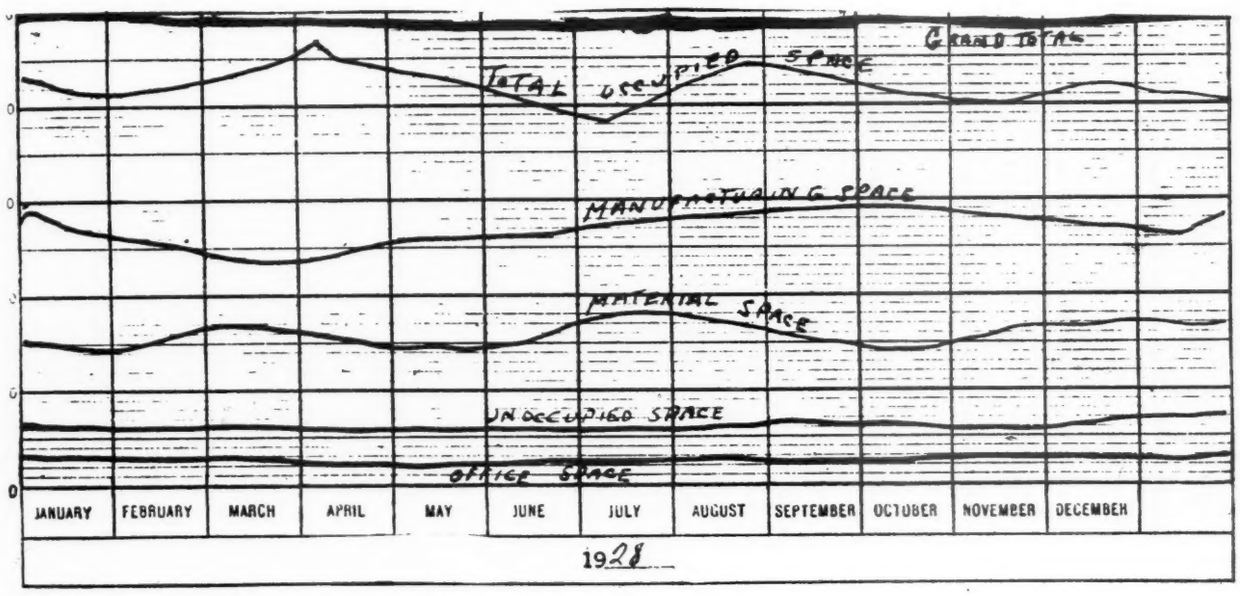


Chart 9—Comparison of Actual Space Occupied and Unoccupied

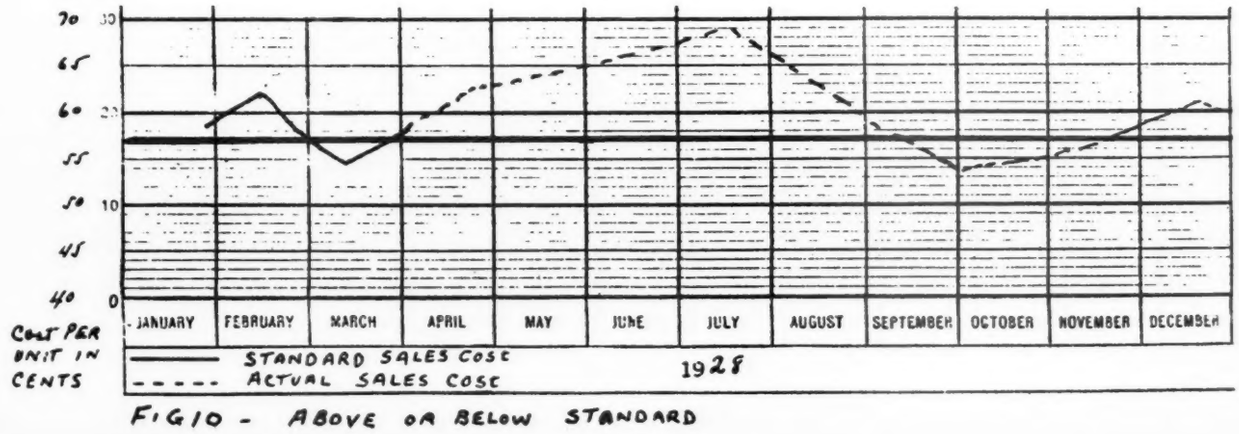


FIG 10 - ABOVE OR BELOW STANDARD

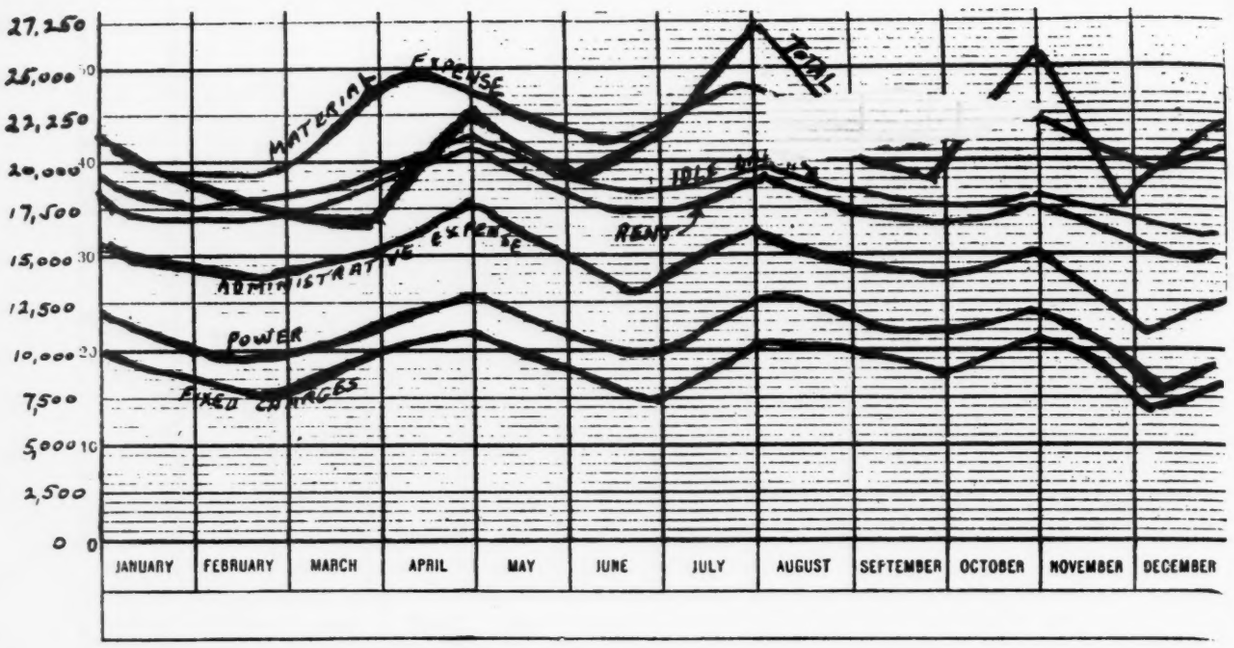


Chart 7—Constructive Graphic Analysis of Production Expense

between day work and piece work labor respectively, and also a comparison of the equivalent number of productive employees as segregated by day work and piece work employees. The particular value of a chart like this lies in the fact that it will show at a glance the exact status of the labor situation, and is so arranged that abnormal conditions will be easily reflected.

An analysis of Chart 5 reveals the fact that a much greater output has resulted because of the increase in piece work labor; and hence a very healthy condition is reflected because of the increase in earnings of the majority of the employees and also because of the benefit to the management through increased production.

A chart of this kind when used by the management will show very clearly conditions just as they exist and also the progress that is being made either to improve or to remedy existing conditions. Chart 5 indicates to the management that in this instance it should encourage the further extension of piece work labor instead of day work labor. The chart clearly shows that when employees were put on piece work not only did they increase their earning power, but also they produced an increased efficiency with its corresponding saving to the factory as a whole.

Chart 6 is a comparison of the merchandise produced for different periods to the number of production employees required to do the producing. The unit of measurement in this case is "production value per employee." This chart supplements Chart 5 and shows the result of the extension of piece work during the latter part of the year in the factory under consideration. The "value of production per employee" shows a very marked increase. For example in January, the "product per employee" was less than $250; while at the end of the year, the output had increased to $425 per employee.

It must be noted however that a chart of this kind is of value only when an approximately standard line of manufacturing is being done. It would not give a good basis of comparison under conditions where the value of the material used in manufacturing advanced considerably in price, or where an entirely new line of work might be introduced.

Chart 7 is a constructive graphic analysis of manufacturing expense. This chart analyzes the manufacturing expense into its various constituents, that is power, rent, tools, administration, material, fixed charges and idle labor.

Chart 7 tells clearly where an increase in expense or its equivalent occurs. Thus in the month of March, there is a slight increase in power expense and material expense over the month of January. Whatever the cause may be, it is a matter of simple analysis of the charges made to the one or more subdivisions of expense showing an increase. The responsibility for such increases, therefore, can be placed. Another advantage of this chart which shows an analysis of expense is that of reflective increases in some one or more of these different classes of expense, even when the total manufacturing expense for that period is well within normal limits. For example, the chart shows a very decided increase in material expense during the month of July, which is perhaps due to a large amount of defective work. With this indication of something, the proper means can be applied to remedy the situation, and the expense may be even further reduced to its proper level.

(*Continued on page* 73)

WESTERN LIME PRODUCTS DEVELOPS LARGE DEPOSIT ON BLUBBER BAY

THE Western Lime Products Company, with offices in the Lumber Exchange Building, Seattle, Washington, is developing a limestone products plant at Blubber Bay on Texada Island, British Columbia. The products of the present and proposed installations will be loaded on a scow and shipped to points within reach of the plant or inside of the freight range and maritime delivery.

Owing to the increase in demand for lime products, the company acquired the property with almost unlimited possibilities. The demand is due to many apparent reasons, including the large building programs of the Northwestern cities; the increase in the number of manufacturing plants requiring lime; the ever increasing pulp and paper industry, which requires large quantities of limestone for fluxing; and the wet condition of the soil that necessitates the use of large quantities of lime fertilizer to sweeten the soil, as shown by Government reports. The International Harvester Company and the National Lime Association estimate that the Northwest should use 660 tons of lime per day to raise the required crops for the acreage under cultivation. This estimate only covers about 2 per cent of the land within the trade range of the Western Lime Products Company. According to surveys, the trade territory of the plant will consume daily not less than 5,300 barrels of burnt lime, 340 tons of hydrated lime and 260 tons of chicken grits.

The property on which the operations are being installed contains one of the few good limestone deposits in the Northwest as no property thus far explored contains such a valuable and easily accessible deposit. According to a recent analysis, the stone is composed of the following elements:

Lime Kiln No. 1, Built of Reinforced Concrete

Lime	53.320
Magnesia	2.200
Iron Oxide	0.230
Alumina	0.030
Silica	0.110
Manganese Oxide	0.140
Phosphorus	0.006
Sulphur	0.045
Loss in Burning	44.010

In addition to the necessary quarrying equipment, a kiln with a capacity of 120 barrels per day is in operation and it is intended to install a fertilizer unit to be operated in conjunction with the present kiln while the other equipment to be installed as conditions permit. Included in the machinery are two additional kilns, a jaw crusher, a pulverizer and a Diesel engine. In addition extensive repairs on the docks are going forward, together with the installation of such elevating, con-

William C. Shaw, Looking Out Over Blubber Bay

View of Quarry Just Being Developed

veying and loading machinery as will be necessary to care for the proposed production.

It is stated by S. P. Westfield, president of the company, that orders for 300 barrels of lime per day are waiting delivery in addition to orders for agricultural lime, raw rock and chicken grits. William C. Shaw, a mining engineer of note with many years of experience in similar developments, is general manager and chief engineer for the company.

Ore Cement

Ore cement was first produced in 1903 by the Hemmoor Portland cement mill. In the twenty-five years since that time many advances have been made in the process of its manufacture. It was originally proposed as being especially resistant to sea water, mineral waters and other liquids containing sulphates in appreciable quantities. At the present stage of cement technology, it can almost be said that the modern ore cements may be classed with the high quality portlands. To be sure, the high initial strength of the latter cannot be guaranteed always with ore cement, still, this strength is found by almost every test. The supposed great resistance of high quality cement (portland) is attributable to the fat mixes employed, to the fineness of grinding and to the subsequent density and tightness of the surface. If ordinary mixes are employed the high quality cement is inferior in chemical resistance to ore cement and often, in fact, to ordinary portland. The decomposition of the cements being due to the chemical reactions of the alumina and lime with the salt solutions, and the fact that the content of lime is greatest in the case of the high quality cements, results in less resistance to salts than that shown by the other cements. The disintegration of the cement is mainly due to the reaction of the lime with the salts in solution. Comparative tests were made of high quality portland and ore cement, curing the test pieces in sea water and in "Conductivity" water, that is water that is as free of salts or other impurities as possible. The mix used was 1:5 standard sand. The results were as follows:

Tensile strength after seven months' cure in	Pure Water	Sea Water	
High quality Portland cement	17.0	12.7	kg./sq. cm.
Ore Cement	18.5	20.5	

Tensile strength after 2½ years curing in	Pure Water	Sea Water	
High quality Portland cement	16.2	10.9	kg./sq. cm.
Ore Cement	17.4	22.2	

Ore cement shows equally favorable results when exposed to hot salt solutions, coal and smoke, and other fumes, examples given to illustrate the uses to which ore cement may profitably be put.—C. Prüssing, (Zement, October 11, 1928.)

Economic Factors in Developing New Sand and Gravel Deposits

The sand and gravel industry has developed phenomenally in the past few years, according to the United States Bureau of Mines, Department of Commerce. From 1922 to 1927 the volume of production of sand and gravel in the United States increased more that 100 per cent. A probable result of such rapid expansion in any industry is the promotion of new projects without adequate study of economic conditions. The ease with which new sand and gravel operations may be started greatly facilitates this expansion. The failure of a new enterprise means bankruptcy to the individual company, and efforts to maintain production in the face of adverse conditions usually has a demoralizing effect on the industry as a whole.

It is highly desirable therefore to place before prospective operators the various factors on which the success of a sand and gravel enterprise depends. The Bureau of Mines, through its Building Materials Section of the Rare Metals and Non-Metals Division, has undertaken the task of outlining the conditions that require study prior to starting a new operation.

It is hoped that the forthcoming report will encourage prospective operators to give due study to the factors on which success depends, and thus forestall the beginning of enterprises that would probably result in failure. The prevention of such unfortunate results should increase the stability of the industry as a whole, and thereby benefit both producer and consumer.

NEW WASHING PLANT FOR NEW HAMPSHIRE

By George Ransom

IT WOULD seem that the demand for sand and gravel is on the increase in New Hampshire as a new plant for the production of this material is under construction at Milford. This is only a short distance and easily accessible from Keene, Nashua and Manchester, three of the largest cities in the state. It is designed for a production of 500 yards per day and will soon be ready for operation by Winslow and Cummings, the operator, with main offices in Nashua.

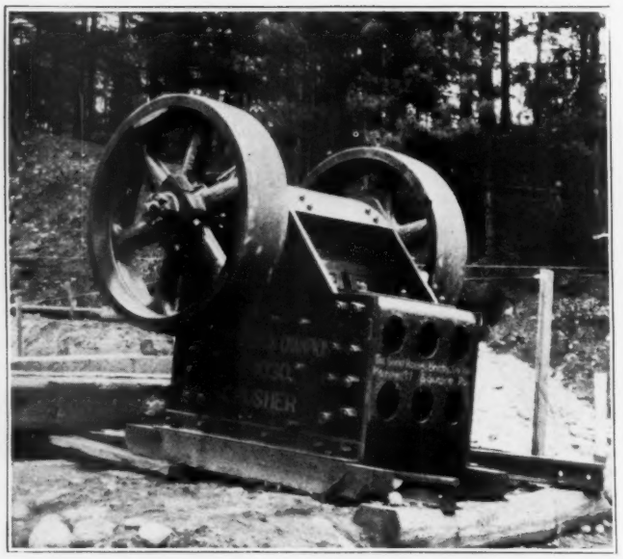
The operation is located between Keene and Nashua on the line of the Boston and Maine Railroad from which a siding to the plant has been laid. The company owns a large tract of land containing a deposit of sharp sand that is ideal for concrete work.

For excavating and conveying the material, a Sauerman power drag scraper, equipped with a Crescent bottomless bucket is provided. The bucket will be emptied into a hopper from which it will be taken by a Good Roads apron feeder to a scalping screen made by the same company. The rejects will pass by gravity to a Good Roads jaw crusher.

It will be carried to the top of the plant by a Good Roads 18 inch belt conveyor with 202 foot centers and the sizing and washing will be done. The sand will be washed with a Good Roads sand washer for which the water will be obtained from a

View of Plant, Showing Concrete Footings for Conveyor

Part of the Bank and Showing Scraper



The Crusher to be Installed

stream flowing near the plant. Bins are constructed of heavy timbers and concrete bases have been provided for the bins, conveyor supports and other machinery which is all electrically operated.

Winslow and Cummings will use a considerable amount of the material in the contracting business as well as sell to other contractors. Most of the shipments, according to present indications, will be made by rail, but adequate provisions will be made for loading and shipping by trucks to the local market. Winslow and Cummings will have the only washed sand and gravel plant in the vicinity and there are only two others in the state of New Hampshire.

World Mica Situation In the First Half of 1928

Imports of crude mica into the United States during the first half of 1928 showed an increase of 6.3 percent in quantity over those for the corresponding period of 1927, accompanied by a decrease of 26 per cent in valuation, according to F. H. Blumenthal of the United States Department of Commerce of the Minerals Division. While the decline in the average value of imports has been general for all classifications of crude mica, the greatest decrease occurred in mica splittings, as the following table indicates:

Imports of Crude Mica Into the United States

Item	First half of—			
	1927		1928	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
Unmanufactured	366,183	$243,152	245,875	$121,016
Splittings	[1] 1,300,937	[1] 530,325	1,525,950	452,428

[1] Includes small amount of cut or manufactured mica.

Imports of unmanufactured mica valued at $0.15 or less a pound have been relatively small, and obtained principally from Canada, Brazil and the Union of South Africa, in the order named. The total value of these imports during the half year was under $1,000.

The unmanufactured mica valued at above $0.15 a pound is composed principally of uncut and untrimmed sheet mica. India predominates as a source having supplied 37 per cent of the total during the first half of the present year. From the table it would appear that Canada holds second place in this trade, but it is to be recalled that receipts from France are undoubtedly of Madagascar origin. Combined imports of 47,174 pounds from France and Madagascar constitute 20 per cent of the total and may properly be credited to Madagascar as the original source. There follow 16 per cent from Canada, 11 from Argentina, 8 from Brazil, and 3 from Guatemala.

India is likewise the outstanding source of mica splittings, having furnished 69 per cent of the total during the first six months of 1928. Combined imports of 255,498 pounds from France and Madagascar represent 17 per cent of the total, and all of this probably originated in Madagascar. Imports from the United Kingdom amounted to 11 per cent and represent re-exports, principally from British possessions. Canada supplied 3 per cent, practically all of the remainder.

Imports of Crude Mica Into the United States in the First Half of 1928

Country of Origin	Unmanufactured				Splittings	
	Not over $0.15 a pound		Above $0.15 a pound			
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*	
Argentina	169	$23	25,017	$11,104	.....	.....
Brazil	4,070	396	19,393	10,289	.....	.....
Canada	5,691	455	37,917	9,582	50,594	$29,183
Costa Rica	.....	...	1,414	754	.....	.....
France	.....	...	33,069	10,139	142,096	55,073
Germany	.....	...	179	105	.....	.....
Guatemala	.....	...	6,320	2,878	200	139
India	100	13	85,632	58,280	1,054,299	299,098
Japan	.....	...	.....	.....	278	168
Madagascar	.....	...	14,105	5,976	113,402	40,212
Sweden	.....	...	474	423	.....	.....
Union of South Africa	2,038	71	2,668	1,235	.....	.....
United Kingdom	.....	...	7,619	9,293	165,081	28,555
Total	12,068	958	233,807	120,058	1,525,950	452,428

Stocks of unmanufactured mica in bonded warehouses, which stood at 46,576 pounds June 30, 1927, increased to 79,070 pounds on December 31, 1927, but declined to zero on June 30, 1928. Corresponding figures for manufactured mica evidenced a steady decline, as follows: 816,997 pounds on June 30, 1927; 804,039 on December 30, 1927; and 522,686 on June 30, 1928.

Exports of 1,301,890 pounds of mica and manufactures during the first half of the present year represent a decrease of 13 per cent from the 1,505,286 pounds shipped during the corresponding months of 1927. This decline in quantity was accompanied by an increase of 14 per cent in total values from $92,122 in the first half of 1927 to $111,569 in the first half of 1928.

GRAPHIC CHARTS AND THEIR USE IN THE CREDIT AND COLLECTION DEPARTMENT

THE use of graphic charts by the credit manager will prove to be invaluable in helping him manage his department properly. As he is responsible for the extension of credit to the customers of his concern he must be in close touch with their financial condition. When large amounts of credit are extended the credit manager should have copies of the balance sheets of the customer. These will furnish the data from which he may make a number of graphic charts to assist him in his work.

The ratio of liquid assets to current liabilities is one of the main factors in deciding whether or not to extend credit and how much to extend. If the percentage is high, the prospective customer may be considered in a favorable light. The graphic chart, Figure 1, shows this ratio over a period of years. The increasing ratio, shown by the upward trend of the curve, indicates that the customer is a sound risk and that the amount of credit extended to him may be safely increased with the trend of the curve as a guide. If the trend of the curve shows a downward tendency, it is apparent that the condition of the customers' business bears close watching.

The credit manager is, of course, interested in knowing whether the customer is making money,

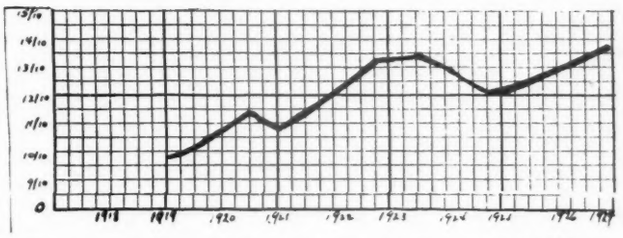


Fig. 1—Relations of Liquid Assets to Current Liabilities

for it is to the advantage of his company to do as large a business with the customer as is safely possible. Figure 2 shows a chart on which the net worth of the customer, as given by his balance sheets, has been plotted over a period of years. If the customer is making money, the trend of the curve will be upward; if he is losing money, it will be downward.

In the collection of accounts, it is necessary to see that accounts due the concern are paid promptly in accordance with the terms agreed upon.

The collection department usually works hand in hand with the credit department. In fact, in many cases, the duties of both are embodied under one head. It is essential that the collection manager know the financial standing of the customer as determined by the credit manager and it is equally important that the credit manager know whether

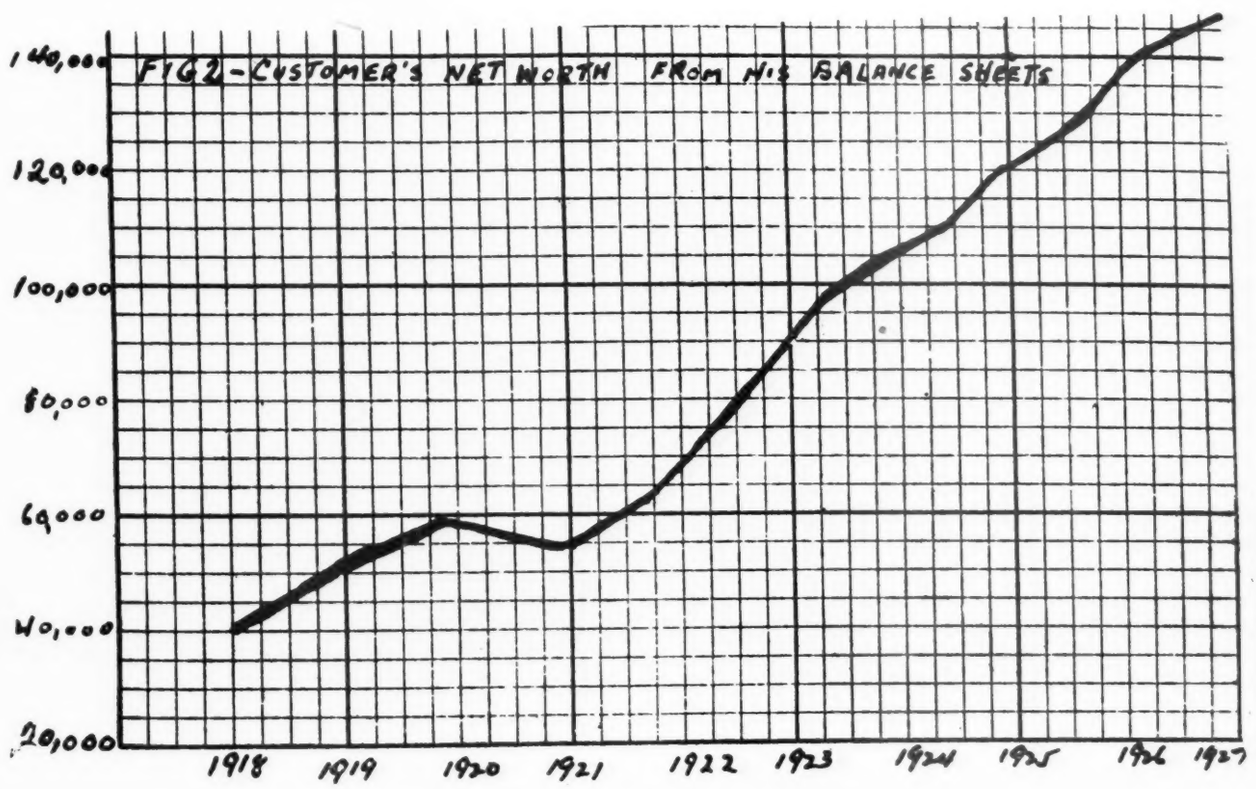


Fig. 2—Net Worth of Customer as Plotted Over a Period of Years

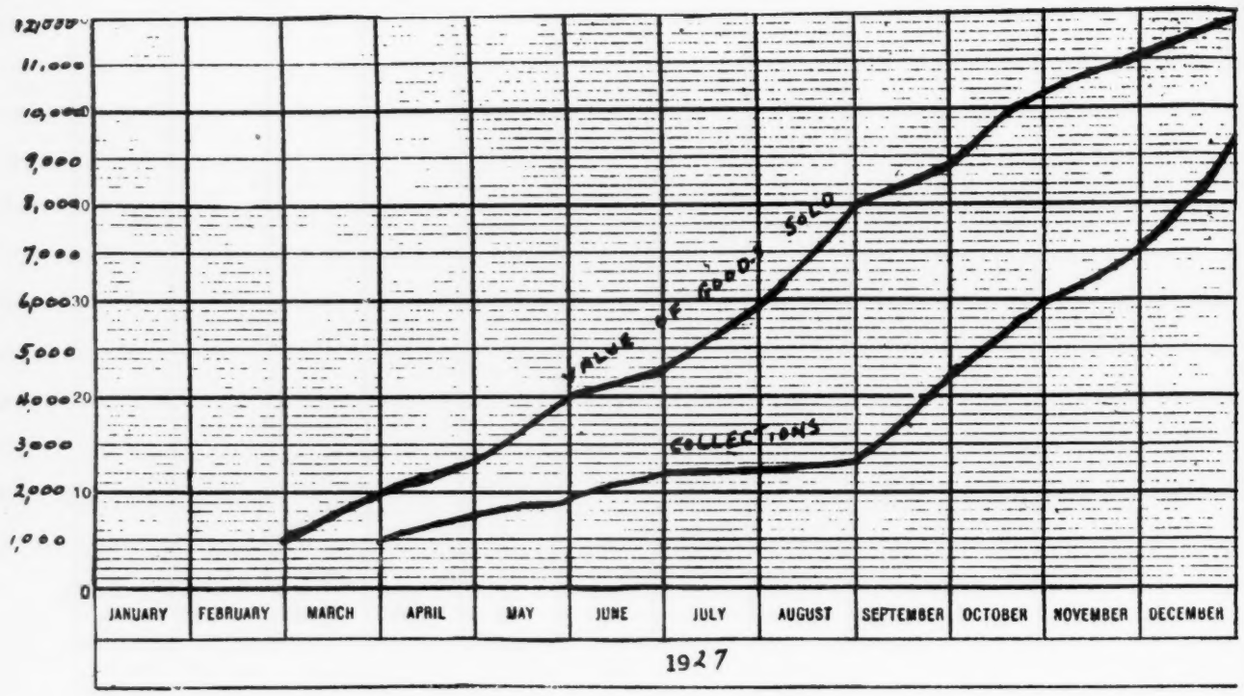


Fig. 3—Value of Materials Sold and Collections

the customer lives up to the terms he has made with the firm.

Graphic charts will enable the collection manager to visualize the status of his accounts, both individual and collective, and hence to keep in closer touch with them, better than any other method.

Figure 3 is a chart showing the value of shipments to a customer compared with the collections received from him. If the curves are parallel, or nearly so, it indicates that the customer is living up to his obligations. If the collections drop off, it is clearly shown on the chart. The average time it takes the customer to pay is indicated by the average "lag" of the collections curve behind the value of shipments. Figure 3 is a cumulative chart, and it shows that at the outset the customer paid one month after shipment. His payments gradually lagged until in June they were over two months behind shipment. In July and August, he paid nothing, but from September to December he paid at about the same rate as he received and there was a lag of about three months.

Figure 4 shows the efficiency of the collection department over a period of years. The upper curve on the sheet is the total amount of accounts turned over each year to the department for collection, and the lower curve is the amount uncollected. If the amount uncollected increases at a faster rate than the total of accounts increases there is probably something wrong with the collection department. The fault may be due to the credit manager in advancing credit to people who are slow in paying.

Figure 5 affords a check on the collection department. Each block represents the value of "slow pay" accounts turned over to the department for collection during the year. The solid black portion at the top of each block shows the amount uncollected or declared "uncollectible" at the end

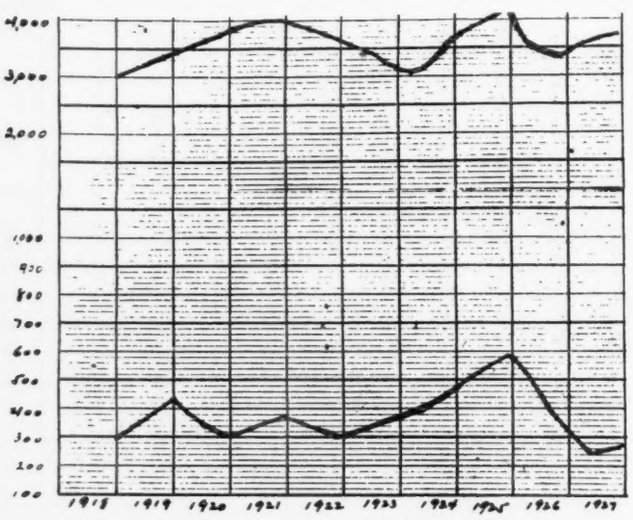


Fig. 4—Total of Accounts Collected and Uncollected

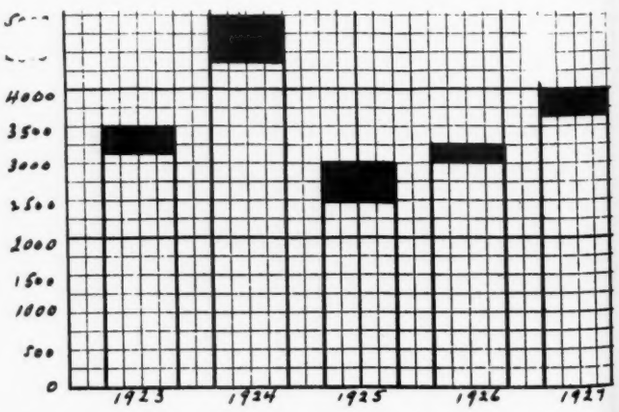


Fig. 5—Efficiency of Collection Department

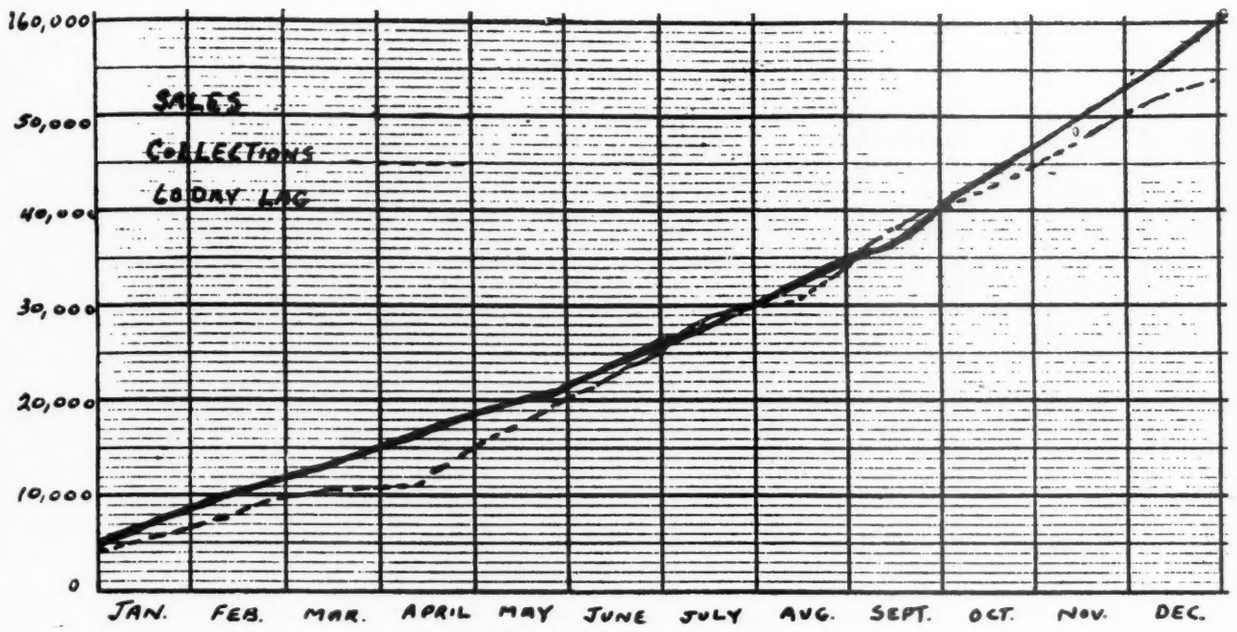


Fig. 6—How Collections and Sales Agree

of the year. It is reasonable to expect that 1924 with a larger volume than 1923 would show a certain increase in "uncollectible" accounts. In 1925 the chart shows that a much smaller volume of accounts were turned over for collection, and yet nearly as much remained at the end of 1925 as remained in 1924. As there was no apparent reason for this, something must have been the matter with the department. At all events, the charts showed something was wrong with the result that in 1926, as the chart shows, the staff made much better showing, which has evidently continued in 1927.

Figure 6 is a graphic chart upon which is plotted cumulatively, from month to month, sales and accounts received; using the accounts received not of the same date as the sales, but two months later. January sales are compared with March collections. January plus February sales are compared with March plus April collections. The same relation holds throughout. Working on a 60-day basis if accounts are collected up to date, the accounts collected line should be nearly parallel with the sales line.

Seasonal lags and spurts in collections are thus clearly shown, and the general relations between collections and sales can be properly maintained. The objection might be offered by some that moneys collected during March might apply on sales in March or any prior month. That is true, but in spite of some hits and some misses the general relation holds nearly enough true to make the chart effective.

(*Continued from page* 66)

Chart 8 shows an analysis of the productive labor and manufacturing expense by departments of the factory. Any abnormal variations in expense or productive labor will be very apparent from an inspection of the graph. For example: Under approximately normal working conditions, a decrease in the amount of productive labor should show a descending curve in the manufacturing expense for that period. If this expense should remain stationary or even possibly show an increase, it would immediately be a signal for investigation.

It is a comparatively simple matter to inaugurate the necessary means for controlling abnormal conditions when they are once indicated. In order to do this, however, it is necessary to know when and where the causes of trouble have occurred; and, therefore the greater the extent to which analysis of the kind here indicated can be carried, the greater will be the corresponding value resulting from the exercising of proper control over these leakages of profits.

Chart 9 is more or less self-explanatory. Its value is in bringing forcibly to the attention of the management the actual space used in production. Often a rearrangement of occupied areas will show that additional space may be made available for manufacturing purposes. Excess space is a burden on the factory; it increases the cost of the manufactured products and is rarely an asset of offsetting value. The necessary steps, therefore, should be taken, when consistent with future policies, to dispose of this excess burden.

Acid-Proof Cement

Instead of pure Si, as described in Brit. 258, 616 (C. A. *21*, 3114), a pulverized alloy of Si with Mg, Ca, Al or Fe is added to waterglass cements. Cf. C. A. *22*, 1225. I. G. Farbenind. A.-G. Brit. 281, 689, Dec. 1, 1926. C. A.

FIGHTING DUST EXPLOSIONS

By Hylton R. Brown*

Associate Engineer, Chemical Engineering Division, Bureau of Chemistry and Soils, United States Department of Agriculture, Washington, D. C.

IT IS no longer necessary to open a paper or a discussion on dust explosions with a definition of the subject, because the terrific blasts which have occurred in recent years in many industrial plants have left no doubt in the minds of owners and operators of such plants concerning the explosibility of dust in suspension in air. The publicity given such explosions in newspapers, magazines, and trade journals has also served to impress upon all those connected with the operation of dusty industries the fact that they have a serious hazard with which to contend. The need for self-protection gives impetus to organization, and accordingly the representatives of various industries have banded together in a spirit of co-operation in order to obtain or exchange ideas which will enable them to combat successfully this menace in their plants.

For years cleanliness has been the watchword in the battle against dust explosions, and the elimination of the dust cloud is still the most effective weapon at our command. In many cases it is possible to prevent explosions by controlling the dust, and much progress has been made in reducing losses by installing dust collectors, pneumatic cleaning apparatus, and dust tight equipment. The elimination of sources of ignition can also be accomplished in some cases, and this method of explosion prevention has proved of value.

There are, however, a number of places in the modern industrial plants where the dust cloud cannot be eliminated, and it is difficult, if not impossible, to prevent the presence of sources of ignition. In such places as grinding machinery, mixing and conveying equipment, and spray driers, the dust cloud consists of the product being manufactured or handled, and its collection or removal cannot be considered as a possible means of eliminating the explosion hazard. Heat, friction, and the possibility of metallic or static sparks being produced during the operations render them particularly hazardous. Dust explosions in such places must be fought, and in this hand to hand encounter unless we have sufficient power and strength to withstand the attack or employ strategy to defeat the enemy our plants will be destroyed.

If you choose to depend on your power and strength then you must indeed protect yourself with strong walls. It is of course impractical to attempt to confine an explosion within walls. In one sugar dust explosion it was estimated that a brick wall 30 feet thick would have been necessary to resist the pressure produced. In a grain elevator explosion a group of concrete storage tanks filled with grain and estimated to weigh 300,000 tons was lifted from the foundation. It is possible, however, to choose a well defended position and ward off an attack by building walls sufficiently strong to divert an explosion or limit the enemy's power by dividing his forces into a number of small detachments. Our purposes are best served by supplementing power with strategy. Draw your maps and plan your defense in advance, and then when the attack occurs let the enemy assist in his own defeat.

Just as a general attempts to split up the enemy's forces, so should a hazardous process be segregated and split up into small units. If it is necessary to have the unit located within the plant proper then it should be separated from other parts by strong walls with a light outside wall, roof, large window area or automatic sash equipment arranged to permit the venting of an explosion before dangerously high pressures are developed. The wall separating this unit from your plant then becomes your fortress, and all openings through that wall must be carefully guarded. A screw conveyor with several flights removed to form a choke can be used to carry material to or from the machinery in which the hazard exists, and a revolving paddle wheel or damper can be used to seal effectively any spout openings through your wall of defense.

All the above-suggested measures have been adopted and found effective in fighting dust explosions, but at best they are measures of protection only. They do not rout the enemy but serve only to reduce or scatter the losses.

But now a more effective weapon has been developed and we can render our plants absolutely immune to attack. Dust explosion losses are prevented because no dust explosion can occur. It is now possible to take the offensive instead of being always on the defensive, because inert gas has come to our aid and with it we can render the enemy's ammunition useless for any attack on our plant. It has been found that of the requisites of a dust explosion, namely, dust in suspension in air and a source of ignition, it is the oxygen of the air which serves to support combustion.

By introducing an inert gas like carbon dioxide or nitrogen until the percentage of oxygen is reduced below that necessary to support combustion it is impossible for an explosion to occur or a flame to propagate. There is, however, a restriction on the use of this method of fighting dust explosions. It is impractical to consider flooding an entire building or even a room with inert gas. Workmen

* Presented at National Safety Congress.

would be unable to breathe in such an atmosphere of low oxygen content. Inert gas, however, lends itself readily to use in inclosed units and is particularly well adapted to use in grinding equipment. It is with this phase of the subject that investigators have been dealing recently, and as a result of experimental work and factory tests the value of inert gas as a preventive of dust explosions has now been so well demonstrated that its use should be seriously considered wherever an explosion hazard exists which cannot be controlled through the elimination of the dust cloud or the source of ignition.

When planning the installation of an inert gas system the first consideration is of course a source of supply from which sufficient inert gas can be obtained. Where a steam power plant is operated in connection with a mill or factory, designing and installing inert gas equipment for explosion protection is comparatively simple. Where no power plant is located within a reasonable distance of the mill, gas producing equipment can be installed. In either case there are seven factors which should be determined before attempting to design a satisfactory system:

(1) Quantity of air which normally enters the machine or equipment, (2) reduction of oxygen necessary to prevent explosions of the materials being handled, (3) percentage of oxygen, if any, in the gas used to create the inert atmosphere, (4) quantity of gas required, (5) availability of the required quantity of gas, (6) type of gas conditioning equipment, if necessary, (7) the type of gas distributing system best adapted to the plant.

By giving careful consideration to these important points and planning the protective system accordingly it is possible to eliminate from the most hazardous points in industrial plants all danger of dust explosions and win through strategy a victory which we have been unable to accomplish with the weapons previously at our command. The Chemical Engineering Division of the Bureau of Chemistry and Soils will render all assistance possible in your fight against dust explosions and will be pleased to send on request available publications on dust explosions. Anyone interested in the use of inert gas, the newly developed method of explosion prevention, should write for "Technical Bulletin No. 74—The Value of Inert Gas as a Preventive of Dust Explosions in Grinding Equipment."

Results from Highways

New highways in Ethiopia will give outlets to the insistent pressure of the people and country for expansion of their agricultural production. They will facilitate the distribution of imported manufactured goods to a people whose demand and purchasing power will have thus automatically been many times increased.

Belgian Cement Industry Has Increased Exports

Exports of cement from Belgium in 1927 advanced to 1,639,000 metric tons from 1,462,000 in 1926, as recorded by the Bulletin d'Information et de Documentation, August, 1928, published by the Banque Nationale de Belgigue.

In the following table cement shipments from Belgium during 1926 and 1927 are compared with those of 1913 for the leading countries of destination:

Belgian Exports of Cement

Country of Destination	1913	1926	1927
	Metric tons	*Metric tons*	*Metric tons*
Netherlands	179,000	341,000	391,000
Great Britain	88,000	189,000	319,000
United States	.....	370,000	237,000
Argentina	221,000	150,000	152,000
France	46,000	104,000	106,000
Egypt	24,000	51,000	72,000
Brazil	55,000	32,000	55,000
Syria	.....	24,000	35,000
Canary Islands	5,000	22,000	28,000
Congo	10,000	20,000	22,000
Morocco	43,000	(1)	(1)
Germany	39,000	.....	.....
Other countries	177,000	159,000	222,000
Total	887,000	1,462,000	1,639,000

The most notable change during the first six months of 1928 was the advance of the United States into second position on the export list, ahead of Great Britain. France dropped from fifth to seventh position, as the result of artificial restrictions on exports to that country while Brazil went from seventh to fifth position by almost doubling its imports of cement from Belgium. Belgian cement predominates in practically every country which has to depend upon the imported article, with the exception of the Netherlands. In 1925, Belgium furnished 140,000 tons of cement of a total of 217,000 imported by Great Britain, and 145,000 tons of a total of 343,000 imported by Argentina. Notwithstanding its own important cement industry France imported that year 248,000 tons, of which Belgium furnished 113,000, and Switzerland and Germany most of the remainder. In 1927, Belgian exports of cement to the Netherlands were somewhat surpassed by German shipments of 418,000 tons to that country, but an agreement between German and Belgian producers will divide the Netherlands market more or less equally between the two in the future.

At present the Belgian cement industry is working at capacity. The constantly increasing production—now undoubtedly close to 3,000,000 tons as compared with 1,500,000 before the war—has caused some weakening in price, but is being absorbed easily, with the exception of an accumulation of stocks in the Mons region. The higher prices for coal have reduced the margin of profit on cement, but have not yet affected the situation seriously nor caused higher prices.

Manufacturers Division Holds Annual Dinner

The annual dinner meeting of the Manufacturers Division of the National Crushed Stone Association was held at the Hotel Pennsylvania, Friday, October 26th, at six-thirty P. M. W. M. Andrews, chairman of the Manufacturers Division presided at the dinner.

O. M. Graves, chairman of the Executive Committee, the speaker of the evening, reviewed the work of the association and expressed appreciation of the cooperation which had made the Association possible. He stressed the pleasant relations which existed between the National Crushed Stone Association and the Manufacturers Division. A. T. Goldbeck, of Washington, gave an interesting talk on the new Research and Testing Laboratory, now completed and in operation. J. R. Boyd, secretary of the National Crushed Stone Association, told of the arrangements for the 12th Annual Convention of the Association to be held at Cleveland, O., January 21-22-23-24, 1929.

An enjoyable feature of the affair was the presence of the members of the New York State Crushed Stone Association, as guests of the National association. The meeting of the New York State Crushed Stone Association was held earlier in the day at the Hotel Pennsylvania.

Brief talks were given by John Rice of Easton, Mr. Greensfelder of the Hercules Powder Company, Mike Garber of the Thew Shovel Company, and Mr. McEwan of the Allis Chalmers Company. Mr. Davidson, Chairman of the Manufacturers Division of the National Sand and Gravel Association conveyed greetings to the National Crushed Stone Association.

Only Fresh Made Powders Should Be Used

From the nature of the ingredients set forth and a knowledge of the nature of the dopes, it is apparent to Dr. Charles E. Munroe, chief of the Explosives Division, Bureau of Mines, Department of Commerce, that water, in the form of atmospheric moisture or water vapor, may be an active agent in charging explosives in storage. With explosives which are partly composed of salts containing water of hydration or crystallization, this water may be more or less removed from the explosive by exposure to a dry atmosphere, while other explosives containing components that are gyroscopic may take up moisture from the atmosphere.

Moisture is, perhaps, the chief menace to the permanency of an explosive and it is an ever present danger. Much effort and care are exercised by the manufacturers to protect explosives from moisture by enclosing it in a wrapper which is sealed and waterproofed by dipping, and often redipping in molten paraffin, which congeals about the outside of the wrapper. But this device is fragile, so that in handling and packing, and particularly in unpacking by the inexpert, this paraffin coating may become cracked, providing interstices through which moisture may gain access to the explosive. Hence the explosives left in opened and partly empty cases are especially subject to such deterioration. This is even more true of portions of cartridges which have been cut in making of charges. Such cut ends should be well wrapped, stored apart from the rest of the explosives and expended as promptly as possible.

A change of an objectionable nature which comes with time, and which is thought due to the effect of moisture, is the hardening of cartridges from the caking of their components. As made, and as desired for use so that they may be easily tamped and squeezed to fill the borehole at the point of emplacement, the cartridges are soft and pliant. By caking, they tend to become rigid and more force is required to fit them into the borehole. Many explosives, especially those of the gelatin dynamite class, tend to become more insensitive to detonation with time of storage and also to change their rates of detonation.

When compounded explosives contain a liquid ingredient, such as nitro-glycerin, nitroglycol and the like, there is a tendency for the liquid ingredient to concentrate in the lower side of the cartridge during long continued standing in one position. It is the practice of some to turn the cases at intervals, but it is better to use the explosive before any marked change takes place in it. Many users of explosives in selecting an explosive make use of the data published by the Bureau of Mines. The Bureau makes its tests, so far as possible, on explosives that are 60 days old. It should be the aim of users to obtain explosives not much older than the testing age and use the consignment as promptly as possible. Through such practice the user may secure the greatest benefit from the Bureau's efforts.

Coal Production Statistics

In 1925 the mines turned out 320,206,000 tons of soft coal in the eight months; in 1924 they produced 306,130,000 tons; and in 1923 about 381,772,000 tons.

Output in the bituminous workings continues to run behind that of last year as the fall season advances, it is disclosed. The daily average production for the latest week reported was 1,581,000 tons compared with 1,627,000 tons in 1927, or a weekly total of 9,483,000 tons against 9,760,000 tons a year ago.

Production of anthracite also shows a reduction by comparison with last year. Minings of hard coal to September 1, 1928, are placed at 48,697,000 tons. In 1927 output was 54,167,000 tons.

SAVING MONEY ON YOUR FIRE INSURANCE

JUST what can a business man do to lessen his fire hazards, and what effect will such changes have upon his insurance rates? The right answer will save money for many concerns.

What a business man will pay for his insurance is determined, in most states, by inspection and rating organizations which are supported by the insurance companies. These bureaus carefully inspect properties, make detailed diagrams, and analyze the fire hazards inherent in each building according to its structure, occupancy, protection, and exposure, to determine the basis for the rate.

Fire insurance companies have long realized that they can assume liability upon a risk at a lower cost when all hazards, whether of causative or contributive nature, are minimized. With the hazards involved reduced to a minimum, the probability of a loss by fire is also brought to a minimum.

Thus, service departments have been established in each inspection and rating bureau for the sole purpose of advising all parties interested, the insurer and the insured, of the exact status of a risk.

Regardless of where or how the insurance is placed, a copy of the makeup of the rate, and detailed information as to how the fire hazard may be reduced, with the corresponding effect on the rate if suggested changes are made, is furnished without charge. Not infrequently, a concern believes that its class of risk is so good as to warrant carrying as little insurance as possible.

A certain company, for example, owned a fine five story and basement building, substantially constructed. In consideration of the good floor cutoffs, the management decided that a fire could not possibly destroy very much of their property on any one floor and certainly could not spread from floor to floor. If a fire should occur, they were fully equipped with an automatic sprinkler system, supplied with water from a gravity tank on the roof, that would readily prevent the spread of fire beyond a very limited space. Why, they asked, carry insurance for more than a small percentage of their total value of $1,000,000, if their loss, in the event of fire, would probably be considerably below 20 per cent of the full value? For their architect had assured them that each floor was a separate little building by itself. What they did not take into consideration, however, was their next door neighbor. For one night a fire broke out in their neighbor's premises, and played against every window of their building. Even though metal frame wired glass windows had been installed to prevent fires from invading the interior of their building, the heat radiating from the burning building soon raised the temperature on every floor and opened numerous sprinkler heads. This quickly exhausted the water supply and permitted subsequent ignition on many floors, so that a 50 per cent loss was suffered.

The Coinsurance Clause

Such an occurrence brings to the attention the operation of the coinsurance clause in fire insurance policies. On the basis of a $1,000,000 valuation and a 50 per cent or $500,000 loss, what insurance did the owners of this company collect? They had reduced their insurance to 20 per cent of the total value, or $200,000, on the basis that probably not more than 20 per cent of their property value could be destroyed by fire. In accordance with the 80 per cent coinsurance clause in their policies, they should have been carrying $800,000 of insurance. In other words, they were $600,000 short, and were carrying this responsibility and liability themselves. In case of a partial loss, this 80 per cent coinsurance clause requires that the insured become "coinsurer" with the insurance companies for the difference between the amount of insurance carried and the percentage of the total amount that should have been carried as required by the coinsurance clause.

In the case cited, the company was making itself coinsurer to the extent of six-eights of any partial loss. They therefore collected only two-eights of the $500,000 loss, or $125,000, being coinsurers with the companies to the extent of $75,000. They also suffered a further loss on account of the small amount of insurance to the value of $300,000. Had they been carrying their full amount of insurance to value, as required under the coinsurance clause, they would have received the complete amount of the loss, or $500,000.

No matter what the amount of a partial loss may be, as long as the insured does not carry insurance up to the percentage amount required by the coinsurance clause, he will be coinsurer for the difference between the amount carried and what should have been carried.

It is hardly necessary to point out that an intelligent fire insurance agent would never have allowed his client to assume such a dangerous liability as that described.

Practice of General Electric

The method of procedure as it affects fire losses, fire insurance and building construction is to act upon the maxim that "prevention is better than cure." The way to keep down losses, obtain the

benefit of minimum insurance rates, and avoid the interruption of business that follows in the wake of fires, is to take advantage of the best available knowledge in eliminating hazards.

When, for example, the General Electric Company erects a building, and in the last few years they have erected buildings costing millions of dollars, it is only after the plans have been carefully examined and approved by the engineering staff of the insurance companies. These engineers check the plans of each building as to its relation to other buildings, the uses to which it is to be put, the automatic sprinkler equipment specified, and so on.

One result of this policy has been the substitution of reinforced concrete for major buildings instead of the so called "slow-burning" construction (composed of brick and timber walls with plank floors and roof). These buildings have incombustible floors and roof as well as walls; and even then they are usually equipped with automatic sprinklers, because the contents are, to some extent at least, combustible.

Where there are special hazards—such as those of hydro-carbons, varnishes, dipping compounds, enamels, and the like—they follow the policy of segregating these hazards in incombustible rooms outside of the main buildings. Such rooms are also equipped with the most effective safeguards; automatically closing tank covers, devices for injecting steam, and patented extinguishers.

It is obviously far wiser to determine in advance the hazards and to prevent dangerous conditions by proper planning and safeguards, than it is to attempt to make modifications after buildings have been erected and equipped.

Another concern saves money by spreading out the expiration dates of fire insurance policies over the year, instead of having them all expire on the same day. In this way the concern is able at all times to adjust the expense of its insurance proportionately with its inventories, which often fluctuate widely.

This plan is especially advantageous for any enterprise subject to sudden influxes of raw materials which must be covered, or to sudden diminution of finished product upon which it would be wasteful longer to carry fire insurance.

By this method, when inventories rise, this concern takes out additional insurance to cover them. But when they fall, it is not necessary to take a big loss in unearned premiums by canceling any policies. Since one or more fire insurance policies are expiring every month, the insurance can be reduced without loss simply by not renewing a policy equal to the amount of the reduction desired.

When the necessity for reduction occurs on the first of the month, and the policy of the right size does not expire until the last of the month, they permit the insurance to remain in force until expiration.

They keep in mind the fact that the short rate loss ratio reaches the peak at six months after the policy is written, the loss in unearned premiums amounting to 20 per cent. This loss is proportionately less for each month wherein cancellations are made down to the eleventh month; then it amounts to only 5 per cent.

Thus, while they are not able to avoid cancellation losses altogether, their total loss from this source does not run over 5 per cent, since they never have to cancel any policy longer than a month away from the date it would expire. By following this plan, the concern is always fully protected without being overinsured.

Bureau Devises Instruments For Special Road Studies

That "Necessity is the mother of invention" is proved time and time again in the investigation work of the Bureau of Public Roads, United States Department of Agriculture. When a device was needed for measuring the roughness of road surfaces, the bureau developed an instrument called the "roughometer." It is a comparatively simple device which may be attached to any automobile.

The instrument is based on the principle that the amount of spring deflection of an automobile bears a direct relation to the degree of road roughness. The recorder gives the total amount of spring compression in inches for any given distance and a comparison of records obtained on different roads gives a relative measure of their roughness. These instruments are now being used by various State highway departments and one is in use by the Swedish Institute of Roads.

The traffic flow recorder, another device developed by the Bureau, is designed to measure and record the speed of a vehicle at any instant and simultaneously to record the time and distance from any fixed point at the beginning of a trip. The device consists of a clock, an adometer, and a speedometer, all so mounted in a box within the field of a camera that they can be photographed simultaneously.

The instrument measures and records the variable speed of highway traffic, and the simultaneous records of time, speed, and distance, which can be made at any instant furnish the data necessary for studies of the flow of traffic as affected by obstructions, congestion or other variables. The recorder was used successfully in the cooperative highway planning survey in the Cleveland metropolitan region.

PIT AND QUARRY FOREIGN DIGEST

Artificial Stone or Plaster

A hot solution of $MgCl_2$, $FeCl_3$ or other suitable chloride is added to a mixture of MgO and a filler such as a carbonate, siliceous or aluminous clay, calcareous earth, kaolin, sand or $CaSO_4$. A sulphate such as alum also may be added when a calcareous earth or alkaline clay is used as a filler to produce a dry material which sets on addition of water by mixing the ingredients in appropriate order. A small proportion of alkaline silicate may be added to the chloride solution when other fillers are used. W. A. Oakley. Brit. 281, 757. Sept. 6, 1926. C. A.

Setting and Hardening of Concrete at Low Temperatures

Results of the experiments showed that concrete poured into a shaft, the walls of which were below the freezing point, even if the concrete rested directly against the frozen wall, that after two days the temperature of the concrete was still about 4 degrees F. above the freezing point and that ample time is allowed the concrete to set and to harden. This is made possible because of the considerable heat of reaction liberated during the setting and hardening by the chemical reactions taking place. This heat is much greater in amount in large concrete masses than would appear from laboratory experiments. Furthermore it is most important to preheat the aggregate and the water before pouring into such a frozen pit. If this procedure is followed the concrete will harden and set satisfactorily and attain a satisfactory strength. When these materials are mixed at ordinary temperature the temperature lowers itself very gradually as is shown in Figure I. The solid line in this diagram indicates the temperature of the sand of the pit in degrees C. The other curves indicate the lowering of the temperature of the various layers of concrete of the poured mass.—Richard Grün. (Zement, Sept. 27, 1928.)

Shaft Kiln For the Burning of Lime and Cement

A shaft oven with a preheating and deacidifying zone and in whose upper part the raw materials, with a sintering zone arranged underneath so that the sintering zone B has a cross-section very much smaller than the preheating and deacidifying zone A, and its perpendicular axis is arranged relative to the axis of the preheating zone so that the entire shaft B lies on one side of the axis of the shaft A. In Figure II, A is the preheating and deacidifying zone, B the sintering zone and C the cooling chamber.—G. Martin, (German Patent Application 99,498.)

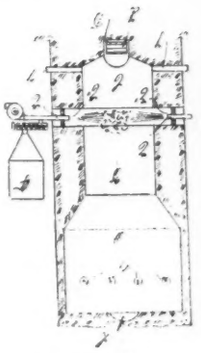


Figure II

Portland Jurament

Portland jurament is made by grinding portland cement clinker, blast-furnace slag and oil-shale cinders. It weighs about 1 kg. per 1, whereas portland cement weighs about 1.4 kg.; so that due allowance must be made when it is measured by volume. When measured by weight the jurament compares favorably with portland cement in strength as determined according to the German specifications. A greater resistance to $MgCl_2$ solution is claimed for jurament. Herbert Kiebs. Tonind. Ztg. *52*, 1384-5, (1928). C. A.

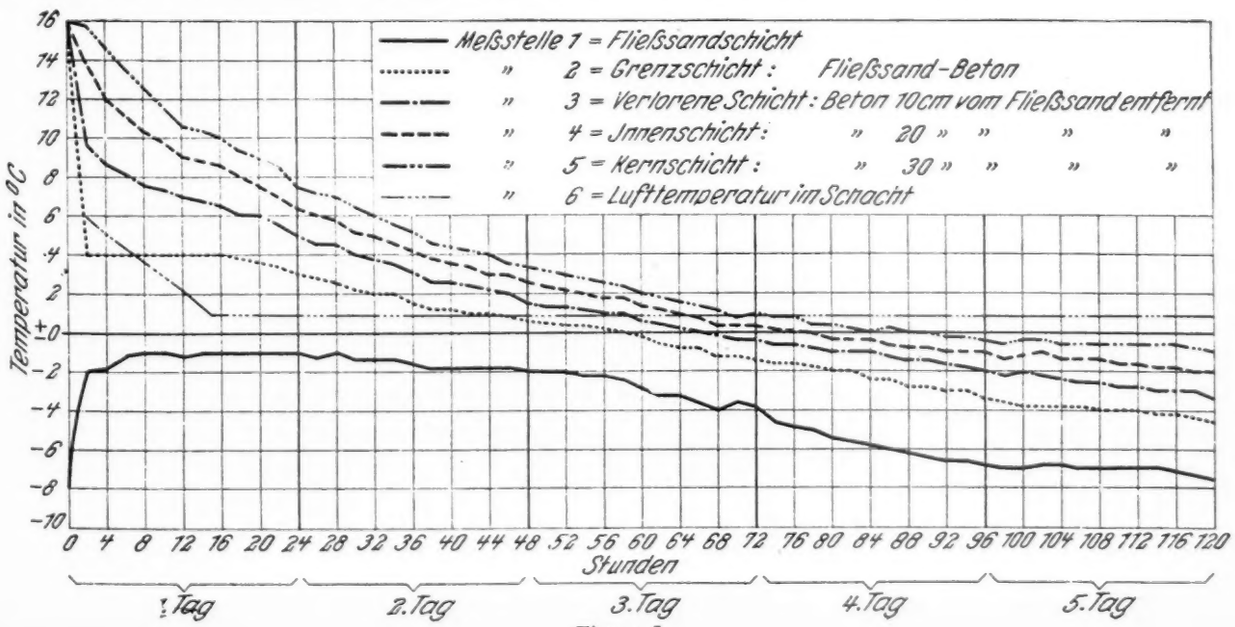

Meßstelle 1 = Fließsandschicht
" 2 = Grenzschicht: Fließsand-Beton
" 3 = Verlorene Schicht: Beton 10cm vom Fließsand entfernt
" 4 = Innenschicht: " 20 " " " "
" 5 = Kernschicht: " 30 " " " "
" 6 = Lufttemperatur im Schacht
Temperatur in °C
16 14 12 10 8 6 4 2 ±0 -2 -4 -6 -8 -10
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100 104 108 112 116 120
Stunden
1. Tag
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Figure I

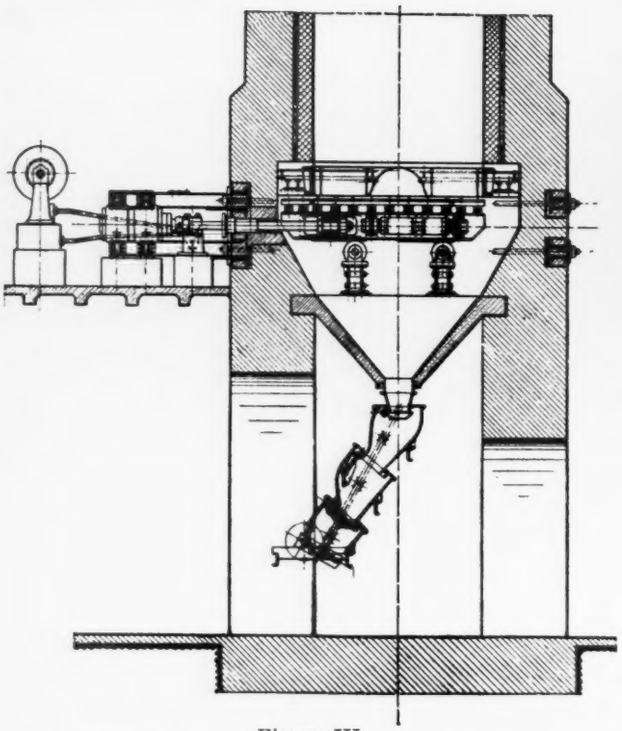


Figure III

Recent German Cement Equipment

Figure III shows a shaft kiln, of high capacity, with hydraulic motive power, and triple clinker discharge. Complete cooling is obtained with this type of kiln. Figures IV and V show two of the latest types of grinding mills for cement.

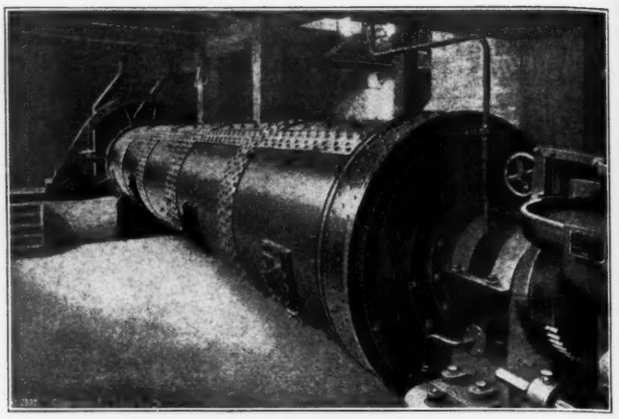


Figure V

Pouring Concrete at Low Temperatures

It has been determined that pouring concrete into shafts whose walls are at temperatures below freezing can be satisfactorily done without the addition of calcium chloride if good cement and aggregate, approximating the Fuller curve, is used. For one cubic meter of concrete, 400 kilograms of cement should be used. The materials should be warm, best at room temperature. Under these conditions a satisfactory pouring will be made.—R. Grün. (Zement, October 4, 1928.)

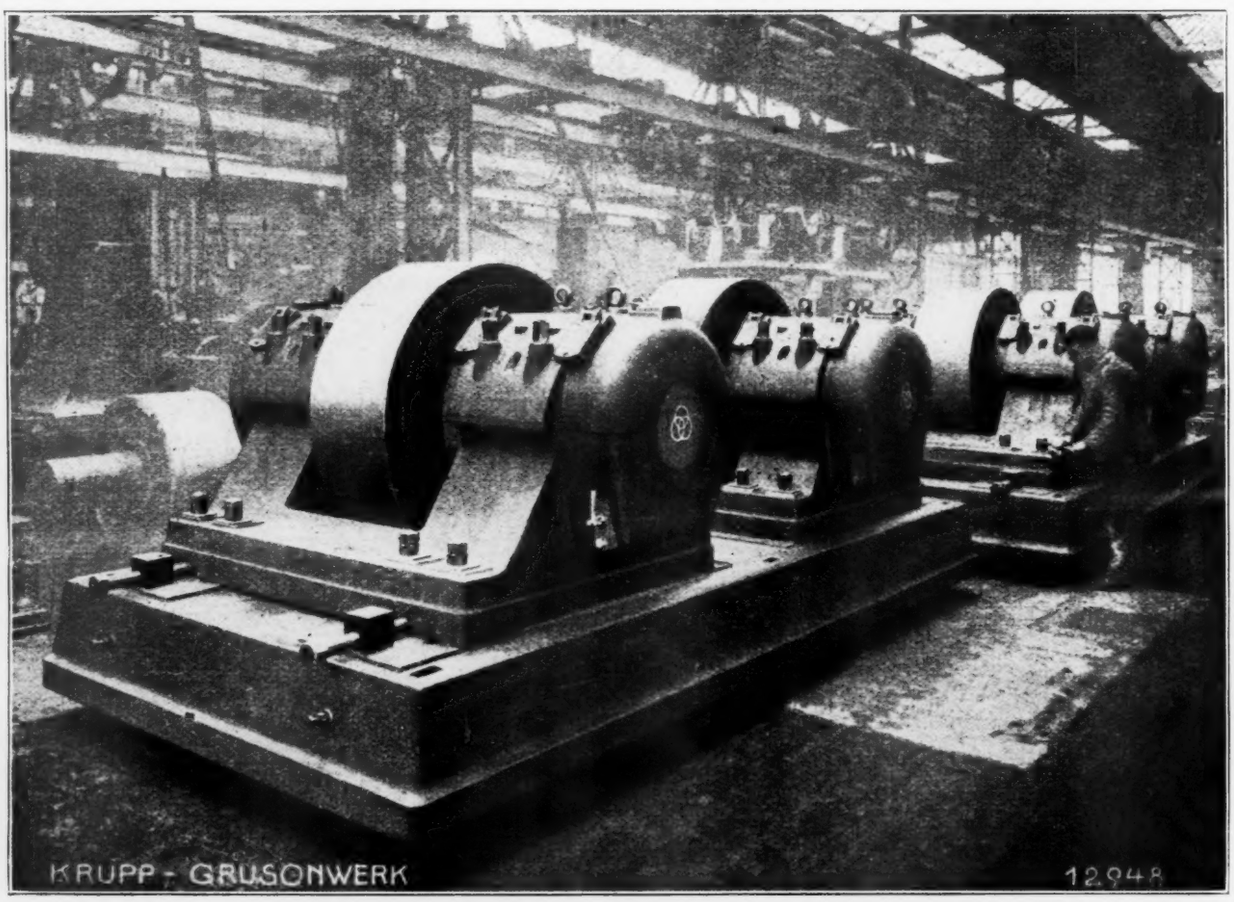


Figure IV

INTIMATE NEWS OF MEN AND PLANTS

Georgia Kaolin Expands

The Georgia Kaolin Company of Dry Branch, Georgia, recently reconstructed and enlarged the entire plant to double its former capacity. The plant has been completely motorized, all machinery now being operated by electricity, and new locomotives, trams and other machinery have been purchased. The property is located on the Jeffersonville-Dublin highway and consists of 202½ acres containing kaolin deposits.

The capital of the company has been increased to over $200,000, more than double the former amount. E. Y. Mallory, Jr., vice president and general manager of the company is a graduate mining engineer as is also his assistant, D. F. McCormick. John B. Harris of Macon is the new secretary and treasurer.

Washington Magnesite Deposits Sold

F. L. Thornhill and G. L. Musgrave of Portland, Oregon, have purchased the controlling interest in the magnesite deposits near Oroville, Washington, formerly operated by the Epso Products Company of Seattle, Washington. Plans are to ship the raw material to a plant which is to be established in Seattle or San Francisco for conversion into marketable material.

Canadian Plant Expands

Harry Hayley, manufacturer of cement products at Ottawa, Canada, has just completed a new addition to his artificial stone plant and has installed a carborundum saw and surfacer.

Georgia Stone Plant Nears Completion

The Southern Lime Products Company's new limestone plant in Crisp County, ten miles southwest of Cordele, Georgia, will be in operation within sixty days. The plant, which represents an investment of $200,000, will have a capacity of about 50 cars of crushed stone per day and is modern in every respect, most of the machinery being electrically driven. A four mile spur line connecting with the Georgia, Southwestern and Gulf Railroad is also nearing completion.

Officers of the company are: C. H. Groves, president; C. D. Walter, vice president; W. K. Snellgrove, manager; and Clay M. Snyder, engineer-sales manager.

C. C. Ingalls Dies

C. C. Ingalls, president of the Ingalls Stone Company, Bedford, Indiana, died at his home in that city on October 23, following a stroke of paralysis. He was 62 years of age and was one of the most prominent stone men in the country. His company is the largest independent corporation operating in the Bedford district and controls the Ingalls, McLaren and Robert Roost mills, the Royal Blue quarries in Lawrence county, a mill at Ellettsville, and a quarry at Ramona, Owen county. He is survived by his widow, three sons and a daughter. Burial was in Greenhill cemetery.

Frank M. Knauss Dies

Frank M. Knauss, president of the sand and gravel firm of Washington, Bulkley, Inc., Brooklyn, New York, died recently at his home in that city at the age of 51. Mr. Knauss was born in Bethlehem, Pennsylvania, and is survived by his widow and a sister. Funeral services were held in the Fairchild Chapel.

Canadian Quarry Installs New Equipment

The White Grit Company of Ottawa, Canada, recently installed an additional steam hoist and an air compressor in the quarry at Portage au Fort. A modern building has also been erected on the property to be used as a boarding house for the employees.

New York Plant Sold

The Rock Cut Stone Company of Syracuse, New York, recently purchased the Solsville plant of the Madison Sand and Gravel Company, which began operation June 1, 1926, for a consideration of $100,000. The purchasing company owns five other plants in the vicinity of Syracuse and Watertown.

Oregon Plant Adopts Tunneling Method

The Black Marble and Lime Company of Enterprise, Oregon, has changed its operations from quarrying to the tunneling method. This was made necessary by the location of the quarry on a mountain side. James R. Billings, superintendent, whose appointment was recently announced in these columns was largely responsible for the change.

Fire Damages Indiana Plant

The Neal gravel plant near Wolcottville, Indiana, was recently damaged to the extent of several thousand dollars by a fire of unknown origin. The main building and clamshell derrick were destroyed.

U. S. Gypsum Builds New Ship For Nova Scotia Trade

The United States Gypsum Company recently placed a contract for a new steamship to be used in carrying gypsum from Nova Scotia to the plant on the Schuykill river, Philadelphia, Pennsylvania, which is now under construction. The new ship will be named the Gypsum Princess and is 347 feet long with a beam of 52.8 feet and gross tonnage of 3915 tons. She will be built by the Furness Shipbuilding Company, Ltd., Haverton Hill-on-Tees, England, and is to be a sister-ship to the Gypsum King, Gypsum Queen and Gypsum Prince which were delivered last April by the same builders. Accommodations for passengers will also be maintained.

Atlas Portland Buys Land

The Atlas Portland Cement Company recently purchased fifteen acres of land in Hamilton township and thirty-three acres in Eldred township, Monroe county, Pennsylvania.

National Portland Buys Texas Property

The National Portland Cement Company, Dallas, Texas, which was recently incorporated for $250,000, has acquired the site of the Gates Chemical Company at North San Jacinto and Mary streets, Houston. The consideration for the transfer was $50,000 and includes a three story, 100 by 200 foot stone and hollow tile building.

H. J. Harris of Dallas is president of the company and C. S. Atkinson, Houston, is secretary-treasurer.

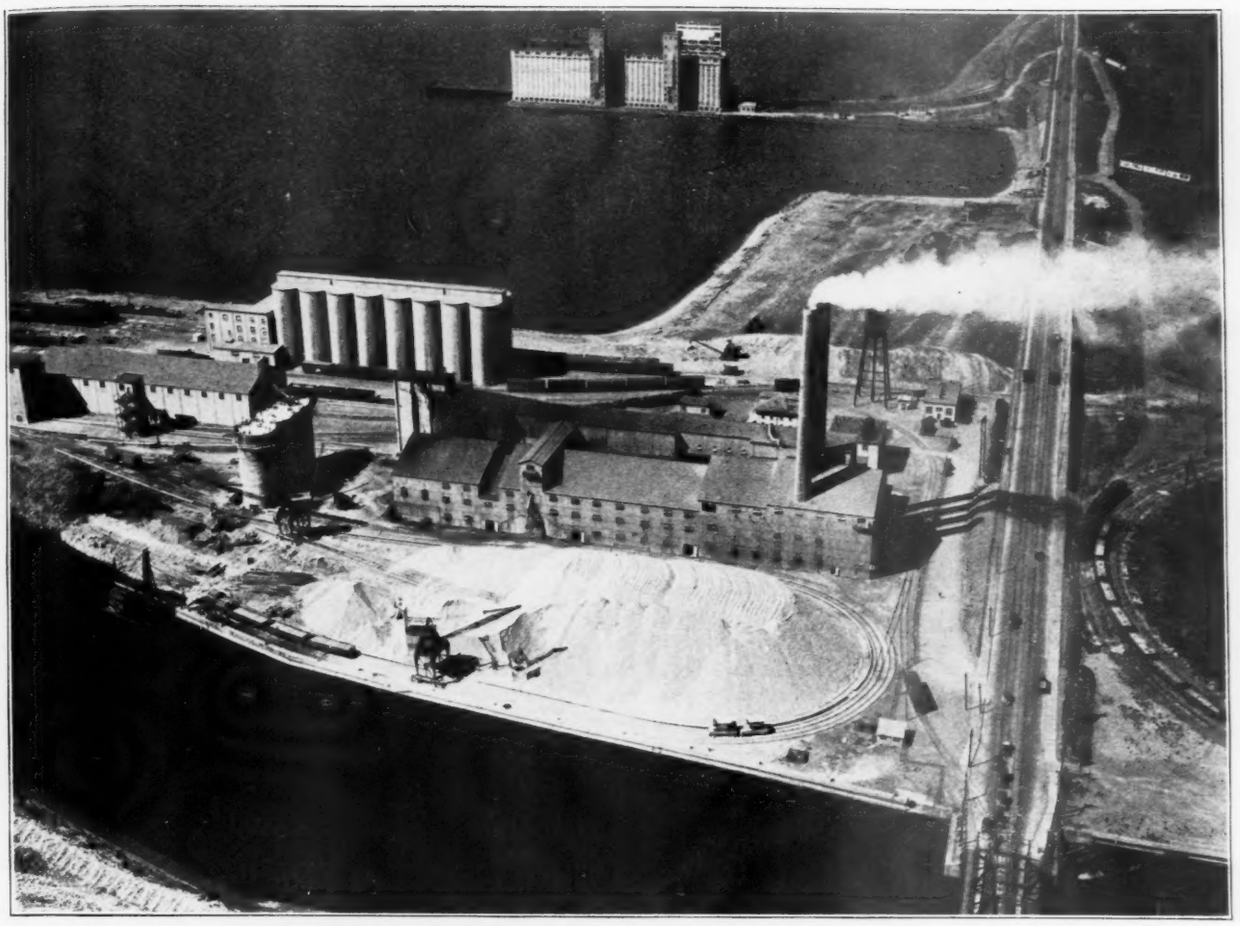
Texas Plant Expands

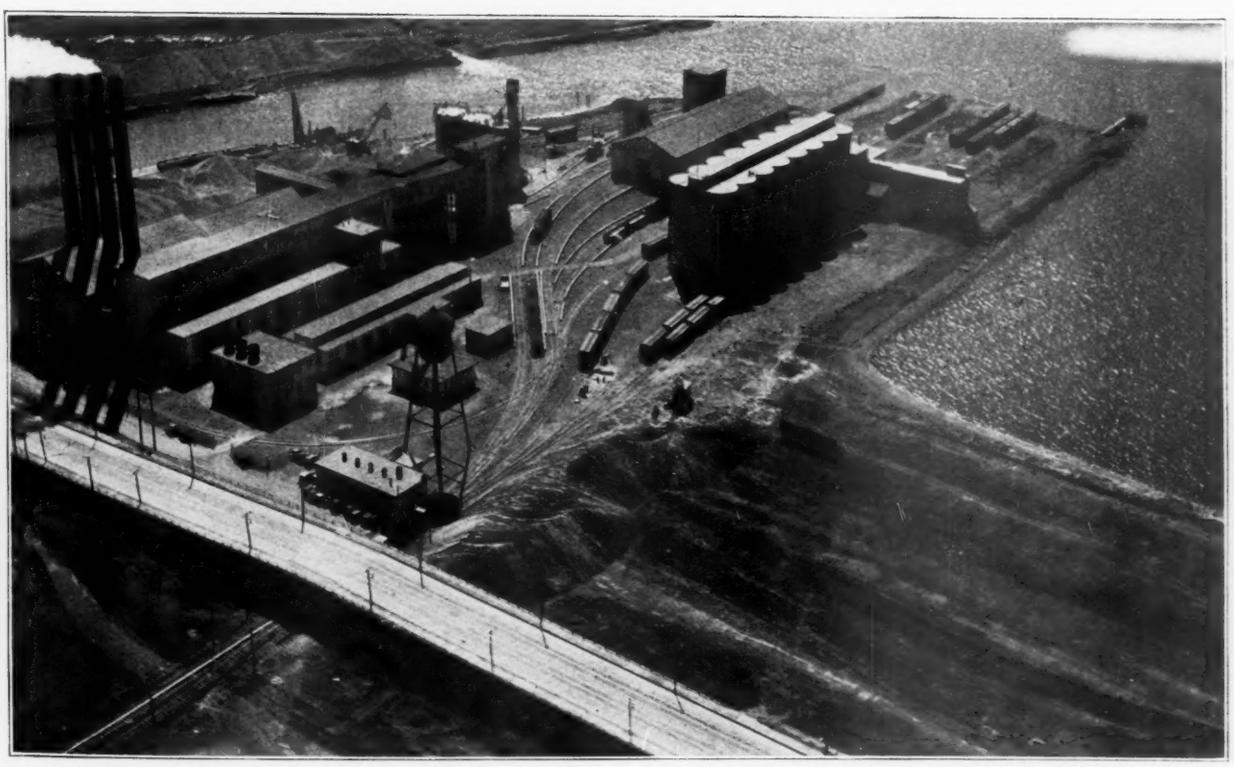
The Gemmer and Tanner Gravel Company, which operates pits at Columbus, Glidden, and Eagle Lake, Texas, and was recently incorporated for $300,000, plans to enlarge its Eagle Lake plant. A new suction gravel pump was recently installed and other machinery is to be added.

A new gravel plant is also to be built at Calhoun and Dowling streets, Houston, on a site which was recently acquired.

This Derrick Crane Is Used by One of the Large Commercial Companies as a Many Purpose Machine. It Is Mounted on Tractors and Is Exceptionally Mobile in Operation. Here It Is Being Used to Make a Stockpile.

This Electrically Operated Shovel Is Part of the Equipment of the Sunset Rock Products Company of Los Angeles, California. The Material Is Dumped Into Cars, as Shown, and Hauled to a Central Cleaning and Washing Plant.





Views of the Great Lakes Portland Cement Plant at Buffalo. This Plant Is a Property of the Lehigh Portland Cement Co.

Petoskey Cement to Build In Wisconsin

The Petoskey Portland Cement Company of Petoskey, Michigan, plans to erect two large concrete silos on the Burnham canal in Milwaukee, Wisconsin, at a cost of about $100,000. Cement will be loaded into the silos from ships by compressed air and then sacked for distribution.

Brookville Gravel Remodels To Meet Increased Demand

The plant of the Brookville Gravel Company of Brookville, Ohio, was originally designed to meet the apparent conditions prior to the decision of Dr. R. P. Somers to enter the sand and gravel field. It was later decided that the demand could only be met by rebuilding the operation and installing such equipment as would be necessary to supply the local market and operate efficiently. Early in the spring of 1928, the plans which had been carefully formulated were executed with all possible dispatch and a completely modernized sand and gravel plant was the result.

For excavating the material a two speed hoist and a ½ yard back dump bucket, manufactured by Street Brothers of Chattanooga, Tennessee, were installed. The hoist is equipped with a 40 h.p. General Electric motor. The bucket is dumped into a hopper and passes to a double deck Simplicity vibrating screen, driven by a 30 h. p. Wagner motor. Water for washing

Bucket Discharging Load Into Hopper

is supplied by an Erie 4-inch centrifugal pump, equipped with a 15 h.p. Wagner motor. On the screens, the sand and gravel are sized and pass to their respective chutes for loading into trucks. The oversizes pass directly to a 9 by 24 Cedar Rapids jaw crusher. After crushing, they are elevated to the screen, where they are sized and pass to the chutes as provided. The owner, Dr. Somers, is quite satisfied with the results obtained by rebuilding, as he has always been in favor of high speed production with an entirely modern plant.

New Indiana Plant

Pleasant Frye and Byron Green recently commenced operation of a new sand and gravel plant near White river bridge, Worthington, Indiana.

Pennsylvania Cement Plant Contracts Let

The iron, cement and byproduct coke plant which is to be erected soon by the Davison Coke and Iron Company on Neville Island, near Pittsburgh, Pennsylvania, will involve an expenditure of about $6,000,000. In addition to the cement plant a blast furnace and 35 byproduct coke ovens will be erected. The cement plant is to have an initial capacity of 1,000,000 barrels annually.

Geo. S. Davison is president of the company and A. P. Meyer is vice president. Contracts have been let to the Dravo Construction Company of Pittsburgh for 200 tons of structural steel, ore bridge and river unloading equipment.

North Carolina Marble Deposit Developed

J. A. Martin of Andrews, North Carolina, has purchased marble deposits at Marble formerly owned by the Regal Blue Marble Company. The overburden has been removed and the quarries opened. Nearly $100,000 has already been spent in developing this property and in purchasing new equipment, such as crushers, screens and elevators.

Chips for terrazzo flooring will first be produced. Several kilns are now under construction to produce lime for land plaster and building purposes. Later equipment for producing monument and building stone will be installed.

Method of Moving Material, with Shovel Stripping Overburden

New Alabama Lime Plant In Operation

The Muscle Shoals White Lime Company of Cherokee, Alabama, has begun operation of a new plant having a daily capacity of 100 barrels.

C. W. Streit Reelected

C. W. Streit, Jr., sales manager of the Southern Cement Company of Birmingham, Alabama, has been reelected president of the Southeastern Association of the American Athletic Union.

New Incorporations

Interstate Cement Corp., Rosendale, N. Y. 5,000 shares n.p.v. Arthur E. Friedman, Pres.; M. Stuart Burton, V. P. and Gen. Sales Mgr.; Andrew J. Snyder, in charge of plant.

National Portland Cement Co., N. San Jacinto and Mary Sts., Houston, Tex. $250,000. H. J. Harris, Pres., 4425 Normandy St., Dallas, Tex.; C. S. Atkinson, Sec.-Treas., 3406 La Branch St., Houston; Eugene S. Gates, Houston, director.

Mitchell Bay Lime Co., Friday Harbor, Wash. $50,000. E. Harkins, Mgr.

Public Service Pulverizing Co., Kansas City, Mo. $20,000. Will produce pulverized limestone rock. Directors, T. J. Pendergast, W. A. Ross, E. L. Schneider. Attorneys, Reed, Holmes & Taylor, Keith & Perry Bldg., Kansas City, Mo.

Santa Clara Sand Co., Santa Clara, N. Y. 750 shares com. E. W. Lawton, Syracuse, N. Y.

Osakis Concrete Products Co., Osakis, Minn. $50,000. Peter Rutten, Mgr.

Wink Gravel & Clay Co., Wink, Tex. $1,000. G. F. Bates, W. L. Bates, Lilly Bates.

Lillington Stone Co., Lillington, N. C. $100,000. Will produce sand and gravel. G. D. Monroe, G. S. Loving, Lillington, N. C.; E. V. Webb, Kinston, N. C.

Delphos Quarries, Inc., Delphos, Ohio. $75,000. J. W. Shumaker, F. C. Meads, F. J. Spieles.

Fauquier Quarries, Inc., John S. Hutton, Pres., Warrenton, Va. $25,000. (Richards & Richards, Attorneys, Warrenton.)

Stone Products Corp., G. W. Riley, Lockport, N. Y. $30,000.

Corona Silica, Inc., W. H. Lyon, Mgr., Rogers, Ark. $750,000.

Serafinelli Granite Co., Quincy, Mass. $10,000. Guido Serafinelli, Pres., 496 Quarry St.

Guarino Marble Wks., 740 Washington Ave., Belleville, N. J. $125,000. Charles Guarino.

Diamond Springs Lime Co., Diamond Springs, Calif. $200,000. H. P. Brown, E. E. Fout, Odell Wilson, R. L. Hollingsworth, Effie Harford Wilson, directors.

Owen Sound Stone Co., Ltd., Owen Sound, Ont., Can. 1000 shares n.p.v. William Breese. To operate crushed stone and marble quarries.

Homer J. Holl Gravel Co., N. Canton, Ohio. $10,000. Homer J. Holl, Marguerite Holl, R. L. Oberlin.

Ohio Aggregates Co., Cleveland, Ohio. 100 shares n.p.v. J. C. Reasner, Louis H. Wieber, M. A. Klein.

Rock Asphalt, Inc., 801 First Nat. Bank Bldg., Birmingham, Ala. M. R. Hutchinson, Pres.; C. R. Bricken, Sec.

Wade Sand & Gravel Co., Lilesville, N. C. $150,000. E. E. Wade, C. L. Jordan, W. H. Land.

Bexley Sand & Gravel Co., Columbus, Ohio. $25,000. Edward D. Howard, Anna Louise Hyde, Collis Gundy Lane.

Frederick S. Beard Passes

Frederick S. Beard, president and manager of the Granite Gravel Company, Ltd. of Windsor, Canada, died Friday October 26, 1928. Thursday Mr. Beard was suddenly taken ill aboard his tug enroute to Giants Limit Island in Georgian Bay to start the erection of a new plant. He was rushed to the General Hospital at Port Huron, where he died Friday morning. Funeral services were held Monday, October 29, under the auspices of the Masonic Fraternity.

Interstate to Build New York Plant

The Interstate Cement Corporation of Cleveland, Ohio, recently acquired the Andrew J. Snyder property at Lawrenceville, New York. Holdings in that vicinity now total 300 acres. A cement plant is to be built with a first unit having a capacity of 1,000 barrels per day to be in operation by March 1, 1929. The old kilns on the property will be used for this first unit but a new plant will be built and equipped with modern machinery. Later two other units are planned which will increase the daily capacity to 5,000 barrels.

The plant is being designed by Soule and Zepp, Inc., engineers, of Baltimore, Maryland. Arthur E. Friedman is president of the cement company and M. Stuart Burton is vice president and general sales manager. Andrew J. Snyder, formerly president of the company which previously operated the property, will be in charge of the plant.

Washington Cement Plant Construction Progresses

Construction of the Pacific Coast Cement Company's plant in Seattle, Washington, is progressing rapidly, and according to Wylie Hemphill, president of the company, it will be in operation early in January. The plant when completed will have a capacity of 150,000 barrels of clinker, 100,000 tons of limerock and 90,000 barrels of finished cement. N. D. Moore, vice president, is in charge of operations, and the product will be marketed as Diamond Portland Cement. Dealerships are being established under the direction of Darwin Meisnest, assistant sales manager.

The precipitator building is being erected by the Sheble Construction Company at a cost of about $60,000 and the Cotrell dust collecting machinery, which is being installed by the Western Precipitation Company will cost as much more. The McDonald Construction Company is constructing the cement storage silos. The Hofius Steel and Equipment Company has the contract for the coal pulverizing plant and the Puget Sound Bridge and Dredge Company is building the bag house.

Arkansas Silica Plant To Develop Deposit

Corona Silica, Inc., Rogers, Arkansas, which was recently incorporated with a capital stock of $750,000, plans to build a modern silica plant in that city. The Danish ball process will be used and a daily capacity of 300 tons is planned. A 42 inch gauge railway is to be constructed between the mine and plant, a distance of about five miles, and a 15 ton locomotive will do the hauling. Electricity will be used wherever possible. H. R. McKnight, Tulsa, Oklahoma, is president of the company, and W. H. Lyon, of Rogers, Arkansas, is manager.

Four Vermont Companies Consolidate Offices

The Eastern Magnesia Talc Company, Inc., the Woodbury Granite Company, Inc., the Rock of Ages Corporation, and the Southern Minerals Corporation have all moved their main offices to 71 South Winooski avenue, Burlington, Vermont. Each of these companies, however, will continue offices located at the working plants: the Woodbury Granite Company at Hardwick and Bethel, the Rock of Ages Corporation at Barre, the Eastern Magnesia Talc Company at Waterbury, Johnson and Rochester, and the Southern Minerals Corporation at Cleveland, Tennessee.

John A. Manley Promoted

John A. Manley, who has for three years been manager of sales development for Fairbanks, Morse and Company, at a recent meeting of the board of directors was elected vice president in charge of sales. Mr. Manley graduated from Northwestern University in 1911 and since that time has had a great deal of experience in various kinds of sales and advertising work.

New Hampshire Quarry Increases Capacity

The New Westerly Granite Quarry at Milford, New Hampshire, recently increased its capacity. A new saw and polishing machine and a 10 ton Milwaukee Electric crane were installed.

Nugent Steel Appoints New Works Manager

Harold C. Osman, secretary of the Nugent Steel Castings Company of Chicago, who was formerly in charge of sales, has been appointed works manager for the company.

Trackson Company Appoints New Distributors

The Trackson Company, Milwaukee, Wisconsin, announces the appointment of the following distributors: Brinker Supply Company, 905 Clark Building, Pittsburgh, Pennsylvania, and R. L. Stockard and Son, 2302 Charlotte Avenue, Nashville, Tennessee. Both of these companies handle the McCormick-Deering Industrial tractor as well as Trackson equipment for the McCormick-Deering, and other related lines.

Production of Crushed Stone Continues to Increase

The production of crushed stone in this country in 1927, according to the United States Bureau of Mines, Department of Commerce, amounted to 94,948,770 short tons valued at $97,474,267, which was an increase of 15 per cent in quantity as compared to the production for 1926. Crushed stone for concrete and road work, 78,544,210 tons, valued at $84,177,237, increased 17 per cent in quantity and crushed stone reported as used for railroad ballast, 16,404,560 tons, valued at $13,297,030, increased 5 per cent.

Table I shows the sales of crushed stone in 1927 by uses and the sales of 1926 for comparison. Table II shows the crushed stone, including concrete and road metal and railroad ballast but not including fluxing stone or agricultural limestone, sold or used by producers in the United States in 1927, by states.

Table II.—Crushed stone sold or used by producers in the United States in 1927, by states.

State	Short Tons	Value
Alabama	196,020	$113,304
Arizona	(1)	(1)
Arkansas	(2) 411,950	(2) 439,228
California	(2) 8,144,400	(2) 6,649,277
Colorado	(2) 187,880	(2) 87,685
Connecticut	(2) 2,168,070	(2) 2,507,189
Delaware	(1)	(1)
Florida	7,382,260	6,041,194
Georgia	(2) 485,850	(2) 551,972
Idaho	231,980	271,540
Illinois	7,643,700	6,006,004
Indiana	4,195,280	4,438,846
Iowa	971,730	932,236
Kansas	742,340	824,268
Kentucky	2,422,690	2,397,990
Louisiana	115,450	169,643
Maine	112,320	140,594
Maryland	(2) 985,790	(2) 1,454,084
Massachusetts	(2) 2,225,010	(2) 3,177,016
Michigan	(2) 1,832,700	(2) 1,235,522
Minnesota	(2) 552,790	(2) 719,452
Missouri	(2) 2,267,670	(2) 2,860,335
Montana	(2) 28,790	(2) 27,933
Nebraska	(2) 69,420	(2) 70,824
Nevada	(2) 355,600	(2) 340,180
New Hampshire	(2) 65,760	(2) 81,739
New Jersey	(2) 2,423,410	(2) 3,695,462
New Mexico	(1)	(1)
New York	(2) 8,945,410	(2)11,470,964
North Carolina	2,079,850	2,902,998
Ohio	11,323,640	9,907,284
Oklahoma	1,668,120	1,326,585
Oregon	(2) 1,429,640	(2) 1,488,273
Pennsylvania	7,295,820	9,251,432
Rhode Island	126,190	259,022
South Carolina	1,164,830	1,632,225
South Dakota	(2) 221,880	(2) 271,521
Tennessee	1,751,890	1,809,358
Texas	(2) 2,896,430	(2) 1,978,413
Utah	(2) 113,500	(2) 116,897
Vermont	(2) 21,020	(2) 31,625
Virginia	(2) 2,335,290	(2) 2,238,212
Washington	586,350	404,508
West Virginia	(2) 740,120	(2) 619,550
Wisconsin	(2) 2,478,510	(2) 2,469,652
Wyoming	53,870	48,728
Undistributed	3,075,040	3,277,594
Hawaii	324,040	576,166
Porto Rico	98,470	159,743
Total	94,948,770	$97,474,267

(1) Included under "Undistributed."
(2) To avoid disclosing confidential information, certain states are slightly incomplete, the figures not included being combined under "Undistributed."

North Carolina Feldspar Plant Under Way

The Feldspar Milling Company of Burnsville, North Carolina, which incorporated last March for $500,000, has the construction of its $85,000 grinding plant well under way. A village to house the employees has been completed.

Table I.—Crushed stone sold or used by producers in the United States, 1926 and 1927, by uses.

Use	1926 Quantity short tons	1926 Value	1927 Quantity short tons	1927 Value
Crushed Stone	82,515,560	$87,872,014	94,948,770	$97,474,267
Furnace Flux	23,859,390	18,049,012	21,666,070	15,985,525
Agricultural limestone	1,850,620	3,064,235	2,206,470	3,360,704

Cement and Gypsum Companies Consolidate Operations

The Canada Cement Company, Limited, and the Atlantic Gypsum Products Company have just made an arrangement involving a consolidation of gypsum quarry operations, effective November 1, 1928, whereby all the crude gypsum rock from Nova Scotia used by those two companies will be produced by Atlantic Gypsum Products Company, instead of being handled separately, as at present. Atlantic Gypsum Products Company will then furnish Canada Cement Company the latter's entire requirements of gypsum rock for its eastern Canadian plants. Further it involves the retirement of the Canada Cement Company, Limited, as a manufacturer of gypsum products in the United States through the sale of its Pennsylvania Gypsum Company plant and business to Atlantic Gypsum Products Company.

The Canada Cement Company, Limited, has up to this time met its requirements for crude gypsum rock for its eastern Canadian plants from its quarry at Ingonish, Cape Breton, Nova Scotia. In addition that Company owns a large deposit of gypsum rock on tidewater at Antigonish, Nova Scotia. Under long-time contracts the Canada Cement Company has furnished to Canada Gypsum & Alabastine Company, Limited, the largest Canadian manufacturer of gypsum products, the crude rock requirements for its eastern Canadian business.

Atlantic Gypsum Products Company has met its own requirements for crude gypsum rock for its North Atlantic Seaboard markets from its quarries at Walton, Nova Scotia and at Cheticamp, Cape Breton, both of which are on tidewater and capable of large-scale operation in the supply gypsum rock. It operates a long-established gypsum products plant located on the East River in New York City, and a complete plant at Portsmouth, New Hampshire, supplying the New England markets. Atlantic Gypsum Products Company's development program includes a logical expansion in these markets.

Under the new arrangement Atlantic Gypsum takes over the plant and business of the Pennsylvania Gypsum Company, which supplies the Philadelphia, Baltimore and Washington markets from its tidewater plant at Chester, Pa. Under a long-time contract Atlantic will ship from its Cheticamp quarries all of Canada Cement's gypsum rock requirements for its eastern Canadian cement plants.

NEWS OF EQUIPMENT MANUFACTURERS

A New Car Spotter

Foote Brothers Gear and Machine Company, Chicago, Illinois, has recently designed and put on the market a new type electric motor driven car pulley. The reduction unit used in the construction of the IXL Hygrade car spotter is the same as the unit used in LXL 6 or 8 vertical worm gear reducer. The worm gear of this car spotter is made from chilled cast bronze of a special formula, and the worm is made from nickel steel, carbonized, hardened, ground and polished. The highest grade of ball and roller bearings are used to take care of radial and thrust loads.

The motor is connected to the worm shaft of the car spotter unit through an enclosed spur gear drive, which provides part of the reduction. The final reduction for the running speed of the capstan is obtained through the worm and worm gear. All gearing is enclosed in dust proof oil tight case. Lubrication is obtained by a simple and effective splash system through the action of the worm gears. The capstan is made of cast iron, machined smooth and is keyed to the upright vertical shaft of the reduction unit.

Black and Decker Exhibit Features Refacer and Drill

Among the major items to be exhibited by the Black and Decker Manufacturing Company, Towson, Maryland, at the Chicago A. E. A. Show and the N. S. P. A. Exhibit at Cleveland, will be the Black and Decker ½ inch universal valve refacer and the ¾ inch heavy duty electric drill with the pistol grip and trigger switch. It will occupy spaces 95 to 98, North Hall of the Coliseum at the A. E. A. Show in Chicago and a prominent place in the N. S. P. A. Exhibit in the Cleveland Auditorium.

The ½ inch universal electric valve refacer has been designed to do the highest grade precision work possible in a production machine. All working parts are carefully machined, the moving tables are constructed on the same principle as the best lathes, and are fitted with automatic spring take-up to compensate for wear. Two separate universal type motors supply the power for the chuck and grinding wheel, assuring delivery of maximum power to the working parts. Armature shafts on both motors are ball bearing mounted, and the bearings are equipped with automatic spring adjustments. The chuck motor is geared to the chuck spindle, the gears running in a grease tight compartment, and designed to operate the chuck at proper refacing speed. It can also be used to sharpen Black and Decker valve seat reamers and valve seating stones. By chucking the refacer with a sharpening mandrel, and dressing them to the prescribed angle, a perfect match between valve and valve seat is assured, making a gas tight fit. Standard equipment included with the refacer comprises a diamond truing attachment and V-block. The grinding wheel is mounted directly on the motor spindle, and operates at proper speed for the size and type of wheel used. The chuck head is adjustable on its base, and can be set to reface valves of 30 degree, 45 degree or 60 degree angles.

The drill has been designed expressly for garage use in driving all types of cylinder grinders and hones. The extremely powerful motor and low spindle speed of this drill give it increased torque, or turning effort, which is so essential in operating positive set grinders. This type of grinder imposes a tremendous load on the drill in the first few turns, and it is here that increased torque is so valuable in a hone operating drill. It will handle practically any honing job, whether spring expanded or positive set hones are used, and is a valuable tool for general garage work and heavy duty drilling. It will use satisfactorily either high speed or carbon steel bits from 3/16 inch to ¾ inch in steel work. The motor armature and spindle thrust are ball bearing mounted, and the motor is the universal type. The drill has a no load speed of 400 r.p.m., and a net weight of 23½ pounds.

Alpha Installs Collectors

The Alpha Portland Cement Company has placed a contract with Northern Blower Company, Cleveland, Ohio, for the installation of a complete Norblo dust-collecting system in the finish grinding department of its plant at LaSalle, Illinois.

Van Dorn Electric Adds To Sales Force

The Van Dorn Electric Tool Company of Cleveland, Ohio, announces that R. M. Porter has been added to the sales force to cover the Philadelphia and Camden, New Jersey, territory. Mr. Porter, who is thoroughly experienced in the service and sales requirements of the company, will make his headquarters in Philadelphia. R. F. Hutt has been placed in charge of the field covered by the Minneapolis office, and will be located in Minneapolis. Mr. Hutt is familiar with the service requirements, and will spare no effort to maintain the standard which has proved satisfactory.

American and Union Chain Combine Plants

The Union Chain and Manufacturing Company has announced that, subject to the approval of stockholders, it has acquired control of the American High Speed Chain Company of Indianapolis, Indiana. The Union Chain and Manufacturing Company builds elevating and conveying machinery together with a complete line of steel sprocket chain, while the American High Speed Chain Company manufactures silent and high speed chains and smaller pitch steel chains together with the necessary sprockets for power transmission. Since the products of the two companies supplement each other, the combination of interests will place the Union Chain and Manufacturing Company in a position to manufacture and market the products of the two companies.

As soon as the approval of the stockholders is obtained and other details completed, the machinery and equipment of the American High Speed Chain Company will be moved to the Sandusky plant, where a new unit has been provided for the proper installation. Two executives of the American High Speed Chain Company, J. C. Howe, president, and W. A. McCosh, vice president, will move to Sandusky to become a part of the new organization.

Trackson Company Appoints Eastern Distributors

The Trackson Company, Milwaukee, Wisconsin, announces the appointment of the following Distributors who will handle its lines in the east: Industrial Tractor Sales Company, Baltimore, Maryland; E. B. Kelly Company, Albany, New York; W. B. May, Buffalo, New York; Truck Tractor Equipment Company, Columbus, Ohio; Tractor and Equipment Company, Newark, New Jersey; and Service Supply, Philadelphia, Pa.

Boston Woven Hose Elects New Officers

At a meeting of the Board of Directors of the Boston Woven Hose and Rubber Company held on October 15th, shortly after the sudden and unexpected death of George E. Hall, J. Newton Smith was elected president of the company and reelected to the office of treasurer. Mr. Smith has been identified with the company for a number of years as vice president and treasurer. At the same meeting, Arthur C. Kingston was elected vice president. Mr. Kingston was formerly director of sales of the company under the late President Hall, and will continue the active direction of sales policies as well as assuming the added duties of his new position.

Vulcalock Process Increases Uses for Armorite

After carefully surveying the field, the B. F. Goodrich Rubber Company of Akron, Ohio, has developed new uses for the material known as "Armorite" for protecting surfaces from abrasion and wear. It is a soft elastic rubber, black in color, of high tensile strength and capacity to repel wear. Armorite has been utilized as a protective covering for several years, but through the recent development of the Goodrich Vulcalock process of attaching rubber to metal, its range of usefulness has been materially expanded. This abrasive resistant may be attached to steel, black iron, blue annealed sheets, aluminum, stainless steel and certain brass compositions, and may be cut, drilled or bent without any injury to the covering or the adhesion.

While it is generally provided with steel backing, it is furnished without backing, or with one or two plies of plain fabric back. Special sheets or metal parts of various shapes may be shipped to the factory and covered with armorite. It is used on chutes, launders, hoppers and other wearing surfaces for handling stone, sand, gravel, ore and other abrasive material. It has given satisfaction in dredge pump liners, shaft coverings, cyclone collectors, fan housings and numerous places in industrial plants subject to much abrasion and wear.

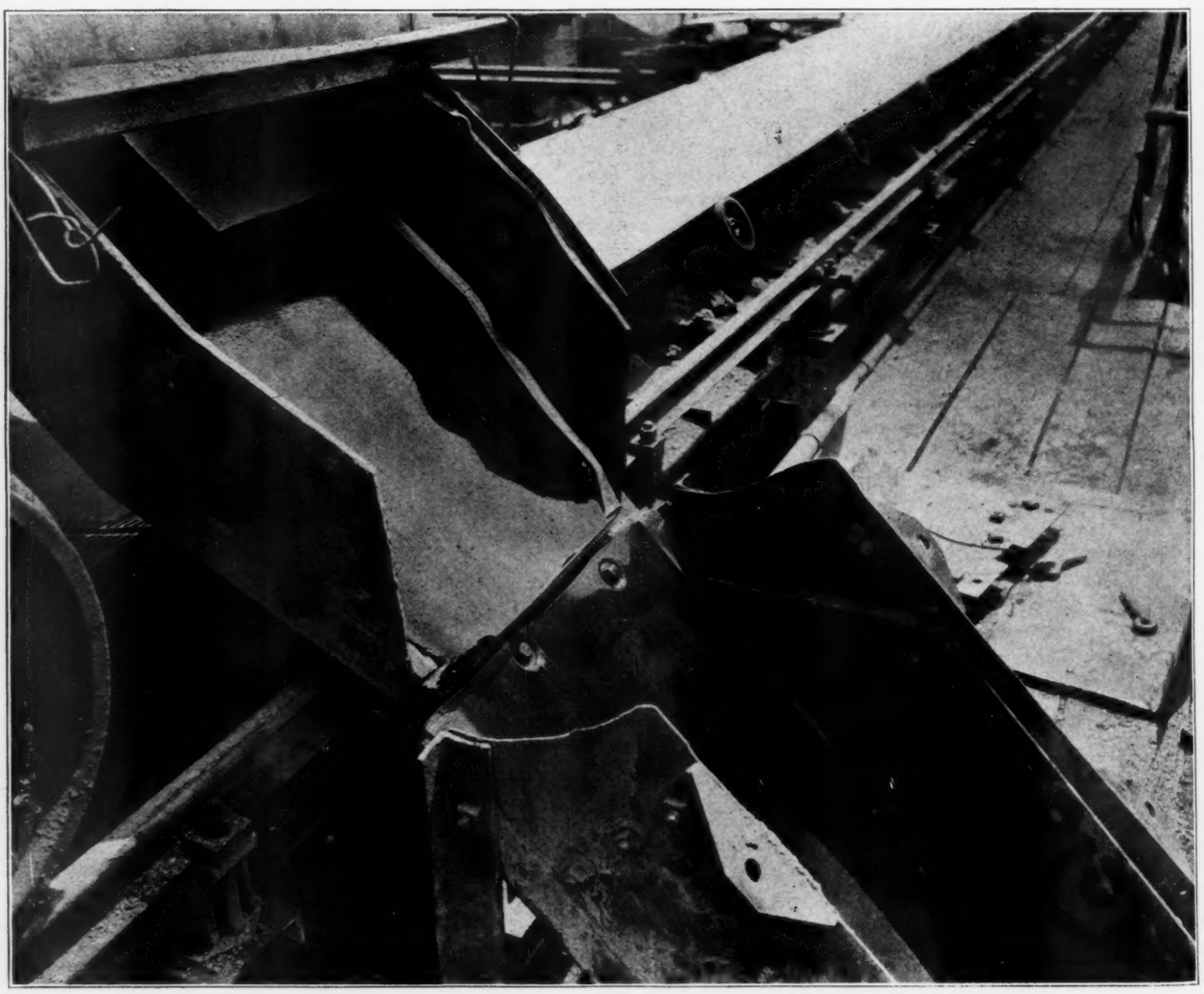
Celite Products Described

The Celite Products Company is distributing Bulletin 108 on insulation of industrial furnaces and ovens. This bulletin, in addition to heat insulating materials, also describes other products made from mineral Celite, including Super-Cel and Filter-Cel for filtration; Celite for concrete to provide workability and watertightness; and a variety of mineral fillers.

The bulletin presents a discussion of insulation for industrial furnaces and ovens, with illustrations and descriptions of the various types and the insulation recommended for them.

Cleveland Pneumatic Catalog

The Cleveland Pneumatic Tool Company of Cleveland, Ohio, is distributing Bulletin number 55-A describing the "Cleco" pressure-seated air valves and air hose fittings. These include hose nipples, menders and clamps, air hose, couplings, and straightway, right angle and three way valves.



Amorite Vulcalocked to a Screen for Protection

Caterpillar Tractor Company Issues Booklets

The Caterpillar Tractor Company, San Leandro, California, is distributing a number of booklets describing various sizes of tractors and the uses to which they can be put.

"Caterpillar Power for Industry," gives illustrations and descriptions of caterpillars being used for spotting heavily loaded freight cars, towing trucks out of mudholes, hauling materials in trailers, pulling stumps and moving large boulders, driving crushers, pumps and belt and bucket conveyors, and many other similar uses.

Another interesting booklet is entitled "The Record of the First Ten Caterpillars." As its name implies it gives the histories of the first ten "30" and "60" tractors manufactured by this company, 17 of which still remain in use.

Black and Decker Report Movements of Sales Force

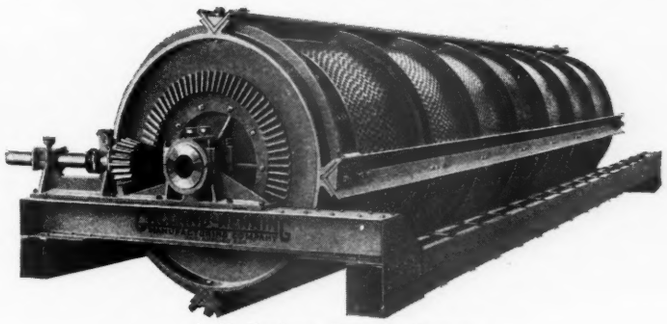
J. V. Franklin, salesman with the British office of Black and Decker, Limited, is on his way to the United States and will spend some time at the Towson factory of the Black and Decker Manufacturing Company, and in the various automotive and industrial centers of the country. He will attend the Automotive Equipment Association Show in Chicago. A. A. Bellinger of the Export Department, and E. E. Powell, Load-O-Meter Department, attended the Second National Highways Congress and Exposition at Mexico City. P. C. Hough of the Service Department will leave shortly for Australia to establish service facilities for the users of Black and Decker products in Australia and New Zealand. Atherton Clark of the Export Department has embarked on a year's trip to include Hawaii, Japan, China, Philippine Islands, Malaya, Dutch East Indies, India, Australia and New Zealand, visiting the present distributors of Black and Decker products in the countries, and establishing new distributing connections.

Galland-Henning Rollerless Screens Described

The Galland-Henning Manufacturing Company, Milwaukee, Wisconsin, in Bulletin No. H-46 describes the rollerless rotary screen. The feature of this screen is that no center supporting shaft or tires and rollers are used, a single bearing at each end supporting the load.

The framework of the drum is made of T section steel tie bars placed between angle strut bars, which are bolted to heads in the machined seats. The supporting framework is also of steel and is simple in design. The feed end bearing surrounds the feed head opening, the lower half of which constitutes the bearing with removable babbitt shell. The drive end bearing has a center opening which permits the use of a water spray pipe throughout the entire length without being supported on any moving part of the screen.

These screens are made in all sizes, right or left hand drive, and with a slope of 1¼ to 1¾ inches per foot as required. All wearing parts can be easily removed without dismantling the screen and all lubrication can safely be done while it is in operation. They are made plain without jacket, with jacket, with plain scrubber and jacket, and with perforated scrubber and jacket.



A Rollerless Rotary Screen

Bristol Long Distance Recording Described

The Bristol Company, Waterbury, Connecticut, is distributing catalog No. 1900 describing long distance electric transmitting and recording systems. With this system all operations at distances of from a few feet up to several miles can be recorded by instruments located at a central point of control.

These systems are made in types to record pressure or vacuum; liquid level, pressure bulb and float type; temperature, several types; and mechanical motion. Multiple systems using more than one receiving instrument with each transmitter are also made. A number of accessories such as alarm attachments, lightning arresters, transformers, rotary converters, motor generators and round and strip charts are also described in this catalog.

Blaw-Knox Describes Steel Buildings

The Blaw-Knox Company, Pittsburgh, Pennsylvania, is distributing an illustrated booklet describing the Blaw-Knox standard buildings. These buildings are of all-steel fireproof construction with a framework of structural steel and side and end walls and roof sheets of galvanized copper bearing steel cover. They are rust proof and their patented construction makes them weatherproof as well.

The buildings are made in a number of different types, but all of them are flexible to changing conditions. Because of the unit type of construction they can be taken down and reerected in a new location or can be enlarged or altered by adding new standard parts. An expansion joint between each sheet allows for temperature changes.

Most of these buildings are all-steel, but some types are designed for brick side and end walls or brick end walls with side walls of tile and continuous sash. The roofs, however, are standard structural steel frame and roof.

Many types of standard steel sash, both plain and ventilating, are described, as well as doors of all types and sizes, including standard hinged, sliding, and folding. Many illustrations show different types of buildings in use. Blawsteel roof sheathing for flat roofed buildings is also described.

Van Dorn Valve Refacer At A.E.F. and N.S.P.A.

The new Van Dorn electric valve refacer has been designed to satisfy the demand for a machine that will reface valves with accuracy, combined with a capacity for a wide range of valve stems and valve angles, and which will at the same time have further uses, as sharpening cutters and grinding rocker arms. It is adapted for general service station use, and has a capacity of 5/16 inch to ½ inch valve stem diameter, with a universal head which can be set at any angle. Some of the features of this refacer are a split phase, constant speed, high torque type motor of ¼ h.p., 1750 r.p.m. at rated load, a double grip collet and a wheel head designed on a new principle, in which a quill replaces the old sliding ways and is mounted in an adjustable housing, sealed from dust and automatically compensating for wear.

Deister Concentrator Screen Described

The Deister Concentrator Company, Fort Wayne, Indiana, in Bulletin No. 12-D describes the Leahy No-Blind vibrating screen. This screen is designed to screen either wet or dry material from 3 inch down to 60 mesh. It is built standard in eight sizes from 17 by 32 inches to 4 by 9 feet and in the following types: belt drive, motor drive, single, double and triple surface, open, and totally enclosed in a dust-proof housing.

The screen cloth alone vibrates, the greatest amplitude of vibration being about ⅛ inch. The most intense vibration is at the center tapering off to either end. The assembly is free swinging, the screen jacket being firmly held between upper and lower mounting bars. These bars are so attached to the frame by knife edges that the zero point of vibration is carried beyond the bars to the knife edges. Either wire screen cloth or perforated plate may be used.

Vibration of the tappet is transmitted to the screen cloth by a connecting rod. The vibrator is ordinarily driven at a speed of 200 r. p m. giving 1600 quick return differential vibrations. The eight tooth cam, which gives the tappet its vibration, operates in an oil bath. The vibrating parts are totally enclosed and are operated through an 8 inch pulley or direct motor drive. The intensity of vibration is controlled by one spring adjustment and the rate of vibration depends on the driving speed.

A tilting mechanism is also described which can be attached to any of these screens. By means of this attachment the inclination of the screen surfaces can be changed at any time to get the highest efficiency when the character of the feed changes.

Buchanan Crushing Rolls

The C. G. Buchanan Company, Incorporated, New York City, in Bulletin No. 14 describes the Type E crushing rolls. These rolls are made both plain and corrugated and are designed for heavy work such as crushing hard rock and ore.

The frame of the crusher consists of two side frames and two end pieces all of which are cast semi-steel. The side frames take the strain while the end pieces hold the bearings in line. Four forged steel tension rods, two above and two below the bearings, equalize the crushing strains. Two bolsters, each with 28 springs, furnish the crushing pressure and can be adjusted to any pressure desired.

The roll shafts which are of hammered steel, are interchangeable, have steel thrust collars to take up side thrust, and phosphor bronze washers to take the wear and prevent dust from entering the bearings. The centers are of cast open hearth steel and are pressed onto the shafts as well as keyed for their entire length. The roll shells are made of chrome, manganese, or special hard steel in corrugated, grooved or plain types. Both fixed and movable bearings of open hearth steel are removable and interchangeable and are lined with babbitt metal.

The hopper is sectional and easily renewable. Two inclined manganese steel baffle plates break the flow of the material and the manganese steel cheek plates can be removed without disturbing the remainder of the machine. Dust covers are of ribbed section cast iron covered with heavy belting canvas reinforced with steel ribs and are hinged to permit inspection of the interior parts. Lubrication is by eight compression cups which can be fitted for pressure feed filling. Removable steel liners allow for adjustment of the rolls. A table of sizes and specifications, method of computing capacities and a table of the capacity of rolls per hour in cubic feet are appended.

A Vibrating Screen Folder

The James Ore Concentrator Company of Newark, New Jersey, is distributing a 4 page folder, No. 5, that describes the wet and dry screens, manufactured by the company. One of the principal features is the vibrating mechanism, that imparts 1800 bumps per minute, and there are mainly only three moving parts which are made of hard, tough steel. These parts are kept in perfect alignment by a heavy dust proof casing filled with lubricating oil and it is pointed out that the vibrator may be run for years without repairs. In the standard screen, a sufficient number of sections are clamped to the underneath side of the hanger bars to build up a screening area 3 feet wide by 6 feet long.

Equipment Corporation Makes Progress During Anniversary

The Equipment Corporation of America has been making progress during its nearly a quarter of a century of service. Shortly after announcing its anniversary, it purchased the Allis Chalmers property in Chicago which has been remodeled to suit its purpose. The main offices of the company have been removed to the new plant at 1134 South Washtenaw Avenue, after 25 years in the loop district. Early in the year it announced the consolidation of the Marsh Capon Company, a subsidiary, with the Construction Machinery Company of Waterloo, Iowa, which permits the manufacture and distribution of a complete line of mixing machinery.

Recently it announced the purchase of all the equipment owned by the James O. Heyworth Company, which was immediately followed by the purchase of the equipment used in the construction of the Conowingo, Maryland dam. This is said to be the largest hydroelectric project in the world with construction equipment that originally cost $1,500,000. These recent purchases together with the stock carried in the different plants is one of the largest and most diversified stocks of equipment ever assembled. An office is located at Conowingo, Maryland, as it is impossible to move the entire complement and store it in the different plants of the company.

Link Belt Standardizes Silent Chain Drives

The Link Belt Company of Chicago has begun the distribution of its latest silent chain publication, Book No. 725. It points out that it is now possible to obtain drives as high as 60 h. p. in practically any reduction from 1 to 1 up to 7 to 1 from this book for immediate delivery. These may be secured from the stocks carried by the regular distributors of the company. These silent chain drives are manufactured at the Dodge Works at 515 North Holmes Avenue, Indianapolis.

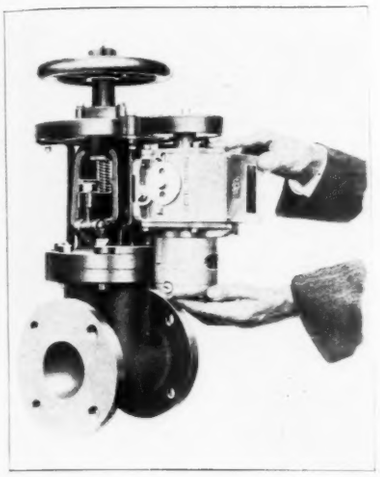
For more than 20 years, the installation of silent chain drives was a special engineering problem. About four years ago, Link Belt engineers advanced the idea that silent chain drives could be furnished from stock and drives of from ½ to 10 h. p. were made available from stock as a joint resolution of standardization and quantity production and in 1926 the range was increased to 15 h. p. Now, according to the announcement, it is possible to secure on short notice the larger power transmission sizes.

Prest-O-Lite Opens Plant

A Prest-O-Lite Gas plant located in North Birmingham, Alabama, commenced operations Oct. 16, 1928. This plant will supply the local demand for dissolved acetylene used in oxy-acetylene welding and cutting. With this addition, the chain now numbers 34 acetylene producing plants situated in industrial centers throughout the country. A. J. Topham is plant superintendent and G. A. Andrews, whose headquarters are at the same plant, is district superintendent.

Motor Driven Mechanism for Operating Valves

A new motor driven valve operating unit has just been announced by the Cutler Hammer Manufacturing Company, Milwaukee, Wisconsin, which makes possible automatic operation of all valves up to 6 inches. Although so small that it can be held in one



New Motor Drive for Operating Valve

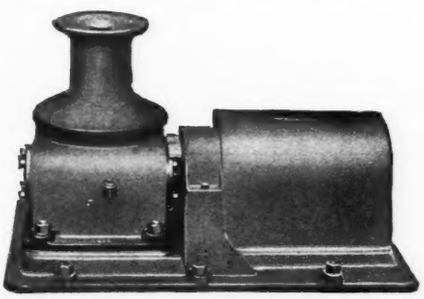
hand, this operating unit has a rating of 15 pound feet. It can be operated automatically by means of float switches, temperature controlling devices, pressure regulators, etc., or by conveniently located push buttons. It is similar in principle to the standard C-H Dean operating unit. While designed primarily for valve operating service in industries, where regulation of pressures and temperatures of gases and fluids is necessary, it is likewise adaptable to many miscellaneous applications, such as operating skylights, awnings, radiators and garage doors.

Largest High Pressure Plant

A project of unusual interest to industrial and public service companies has been announced by the Philip Carey Manufacturing Company, Cincinnati, Ohio, manufacturer of asbestos and magnesia high pressure steam pipe insulation. This company is to construct at the Lockland, Ohio, works a boiler and power plant designed for 1800 pound steam pressure. This will be the highest high pressure steam pressure in America, and the largest high pressure steam plant in the world. W. E. S. Dyer, consulting engineer, Philadelphia, Pennsylvania, will design and have charge of the construction of the new work. The high pressure steam generating equipment will be furnished by Combustion Engineering Corporation of New York. Integral economizers, water-cooled furnace walls, air preheaters, superheaters and pulverized fuel equipment will comprise these units. The main generating units will consist of two 5000 h.p. vertical triple expansion, direct connected engines, operating with 1400 pound pressure at the throttle, at a temperature of 800 degrees and exhausting against 60 pound back pressure above the atmosphere. To each engine will be direct connected a 3 phase alternator. All the equipment for this plant will be placed with American manufacturers, except the main engines which will be furnished by A. Borsig of Berlin, Germany.

Capstan Car Pullers

The Weller Manufacturing Company has built car pullers and a complete line of the horizontal capstan and drum types for years and



A New Capstan

recently two sizes of the upright capstan type which are electrically operated. This type is a compact, self contained unit, occupying little space, easily operated and will pull in any direction or at any angle. The C-1 will develop full strength of 1¼ inch manila rope and will pull from 1 to 3 cars and the C-2 will develop full strength of 1½ inch manila rope and will pull from 3 to 6 cars.

Ross Lists Equipment

The Ross Power Equipment Company of Indianapolis, Indiana, is distributing a booklet listing all kinds of new and used equipment, both steam and electric. Included are stone crushers, engines, kilns, compressors, boilers, pulverizers, pumps, cranes, shovels, buckets, cars, locomotive cranes, conveyors, loaders, draglines, drills, hoists, motors, screens, elevators and other equipment in all types and sizes.

Kennedy-Van Saun Describe Coal Pulverizing System

The Kennedy-Van Saun Manufacturing and Engineering Corporation, New York City, is distributing a folder describing the Kennedy air swept tube mill system for pulverizing coal. Photographs show installations in actual operation and several microphotographs show the fineness to which the coal is reduced. A great deal of information regarding the operating economies of the various installations is also included.

Kennedy-Van Saun Open Chicago Office

The Kennedy-Van Saun Manufacturing and Engineering Corporation of New York City has formed and established the Kennedy-Van Saun Company of Illinois. Offices are in the State Bank building, 120 South LaSalle street, Chicago, Illinois, and F. J. Shearer is manager in charge.

New G. E. Bulletins

The General Electric Company in Bulletin GEA-71B, which supersedes GEA-71A, describes the "900 Series" of wound-rotor induction motors. These are made in two types, MT (3 phase), and MQ (2 phase), and for 220, 440, and 550 volts in sizes of from ¾ to 10 h.p. They are adapted for heavy starting duty and may be used for either constant or adjustable varying speed work.

Bulletin GEA-821A supersedes GEA-821 and describes the improved CR2927 pressure and vacuum switches for either alternating or direct current. These switches are designed for a maximum voltage of 550, maximum pressure of 200 lb. and maximum vacuum of 28 inches.

Bulletin GEA-81B supersedes GEA-81A and describes high torque double squirrel cage motors of from 3 to 15 h.p. with "900 Series frames for constant speed and continuous duty. They are made in Type FTR (3 phase) 220, 440 and 550 volts and type FQR (2 phase) 220 and 440 volts.

How to Begin Application of Arc Welding

The Lincoln Electric Company has recently published a supplement to its 160-page text book, "Arc Welding, The New Age in Iron and Steel." This 32-page book is entitled, "How to Begin the Application of Arc Welding in Production Manufacturing." The bulk of the text is devoted to the redesign of machinery and the principles involved are set forth in such a manner as to make the text helpful. In developing the theory of arc welded design, many line drawings have been used which show clearly how standard steel shapes are utilized to build up structures together with photographs of similar designs which are in actual use.

Rates for display advertisements in the Broadcast Section are given below. If you want to buy or sell used equipment, if you want a job or need a man, advertise your wants in Pit and Quarry. Advertisement copy for publication in the next issue should reach our office within one week after the date of this issue.

RATES PER INSERTION	1 Inch	2 Inches	3 Inches	4 Inches	5 Inches	6 Inches	8 Inches	9 Inches	10 Inches	12 Inches	15 Inches	20 Inches	30 Inches
1 Insertion	$ 3.75	$ 7.25	$10.75	$14.25	$17.75	$ 21.25	$28.25	$31.75	$35.25	$42.25	$56.25	$70.25	$105.00
2 Insertions	3.75	7.25	10.70	14.20	17.65	21.15	28.15	31.65	35.15	42.15	56.15	70.00	104.00
3 Insertions	3.75	7.20	10.65	14.15	17.55	21.05	28.05	31.55	35.10	42.05	56.05	69.75	103.00
4 Insertions	3.70	7.15	10.60	14.10	17.45	20.95	27.95	31.45	35.00	41.95	55.90	68.75	101.00
8 Insertions	3.65	7.05	10.50	14.00	17.25	20.75	27.75	31.25	34.80	41.75	55.70	67.50	98.00
13 Insertions	3.60	6.95	10.40	13.90	17.05	20.55	27.55	31.05	34.60	41.55	55.55	66.25	94.00
26 Insertions	3.50	6.75	10.20	13.70	16.65	20.05	27.05	30.65	34.20	41.05	55.05	64.00	88.00

INFORMATION—"Broadcast" space is sold by the advertising "inch." Each page contains 30 inches. The width of the page is divided into 3 columns, each 2¼ inches wide. Each column contains 10 inches measured the length of the column. Any space may be used measured by the *even* inch in height (not fractions), by 1, 2 or 3 columns in width. The size of a space is its height in inches multiplied by the number of columns in width. Example: a space 3 inches high by 2 columns wide is 6 inches. Copy changes made without additional charge.

It Pays to Advertise in PIT and QUARRY

"We were very much pleased with the results we received from our advertisement in your magazine. The prompt and efficient service rendered by your staff is also to be complimented."—A. Y. Reed Gravel Corporation

Complete Service Publishing Company

538 South Clark Street CHICAGO

Machinery for Sale

SPECIALS
1—4½'x16" Hardinge Steel Lined Mill
1—No. 6 Williams Universal Hammer Mill

CRUSHERS

Crushing Rolls

1—8"x5", 4—24"x12", 1—26"x15", 1—30"x10", 1—30"x16", 2—36"x16", 2—42"x16", 1—54"x24".

Gyratory

All sizes from No. 2 Reduction to No. 12K.

Jaw

1—6"x3", 2—8"x10", 1—6"x15", 2—9"x15", 1—11"x22", 2—12"x24", 1—18"x36", 1—42"x40".

Rotary

Two No. 0, two No. 1, one No. 1½, and one No. 2 Sturtevant Rotary Fine Crushers.

Ring Roll

One No. 1 and one No. 2 Duplex Sturtevant ring roll mills.

Ball and Tube Mills

3', 4', 4½', 5', 5½', 6', 8' Hardinge Mills and Tube Mills.

DRYERS

One 3'x30', Three 4'x30', One 4½'x30', One 5'x40', One 5½'x40', One 6'x60', One 7'x60' and One 8'x80' Direct Heat Rotary Dryers, One 5'x25', One 6'x30', Two 8'x80' Ruggles Coles type "A" and One 4'x20' Ruggles Coles type "B" Double Shell Rotary Dryers.

KILNS

4'x40', 5'x60', 6'x60', 6'x70', 6'x90', 6'x100', 6'x120', 7'x80', 8'x125'.

MILLS

Two 33" and two 42" Fuller Lehigh Mills.
1 No. 0000, 1 No. 00, 2 No. 1, 2—4 Roll, and 1—5 Roll Raymond.
Swing Hammer Mills, Griffin Mills, Attrition and Cage Mills.
Air separators, Screens, Elevators and Conveyors.

The Heineken Engineering Corp.
Industrial Engineers
117 Liberty St., New York City
Courtlandt 5130

CRAWLER SHOVELS

1—SPEEDER- GASOLINE. New Aug. 1927, ½-yd. Shovel Equipment, 30-ft Crane, Boom and ½-yd. Back-Hoe.
1—LORAIN 75, GASOLINE, New 1926, 1¼-yd. HIGH LIFT.
1—ERIE B-2 DREADNAUGHT, Steam. New 1927. 1-yd. HIGH LIFT.
1—MARION 37, Steam, New 1926, 1¾-yd. Boom 26 ft. Dipper Handle 17 ft. Overhauled.

CRANES

1—GENERAL EXCAVATOR, Gasoline Crawler. New 1928, 35-ft. boom, Bucket Operating. Like New.
1—15-ton cap. LINK-BELT, Gasoline Crawler. New 1926, 45-ft. Boom, Bucket Operating. Overhauled. Like New.

GREY STEEL PRODUCTS CO.
111 Broadway New York, N. Y.

CRUSHERS

Farrel 15-B-24 x 36 Jaw.—Manganese Fitted.
Kennedy No. 42 Gyratory Breaker.
Austin No. 10 Gyratory.
Gates 7½-K, Fine shape.
Kennedy Gearless No. 37 Reduction.
Gates Gyratory 12-K, 9-K, 7½-K 4N, 3 and 1.
McCully Gyratory No. 8 5, 4 and .
Symons Disc, 48, 36, 24 and 18-in.
Allis Chalmers Blake Jaw Crusher 12x24 and 18x24.
Good Roads 10x20 portable and 10 x 20 on Skids.
Raymond Mill No. 1.
Stephens-Adamson all Steel Bucket, Elevator Style No. 22—60' Centers.
Stephens-Adamson Pan Conveyor.
Jaw Crushers 7x15, 9x18, 9x15 & 10x20.
Crushing Rolls various sizes.
Blake Type Jaw Crusher 18 x 24.
Sturtevant No. 1½ Rotary Fine Crusher.

OTHER CRUSHERS, SCREENS & CONVEYORS

CRANES & SHOVELS

Marion 37 Steam Shovel Cat. 1¾ yd. A-1.
Marion 270 Stripping Shovel.
Marion 31 Cat. 1¼ yd. low price.
Bucyrus Cl. 14 Cat. Dragline 80' boom, 2 yd.
Bucyrus Cl. 24 Dragline electric 100' Boom.
Northwest 104 & 105 Shovels.
P. & H. 206 Dragline, 38' Boom.
Speeder ½ yd. Gas. Cat. Shovel.
Byers Bearcat Crane 28' Boom, low price.
O. & S. Gas Cat. 40' Boom.
Byers Truck Crane 33' Boom, ¾ yd.
Northwest 104 Crane 45' Boom.
Other makes and sizes on hand.

COMPRESSORS, CARS, LOCOMOTIVES, BOILERS AND POWER EQUIPMENT

F. MAYER
53 W. Jackson Blvd. Chicago, Ill.

BUCKETS

2-yd. Hayward Heavy Duty, 3 Leaf Orange Peel.
¾-yd Hayward Heavy Duty 3 Leaf Orange Peel.
1—4 cu. ft. and 1—5 cu. ft. Hayward Std. 4 Leaf Orange Peel Buckets.
1—1-yd. Hayward Clam Shell.
1—¾-yd. Williams Clam Shell.
1—½-yd. Mead-Morrison Clam Shell.
All Buckets in Chicago Warehouse Stock and Guaranteed Strictly First Class Condition.

Miscellaneous

5-½-yd. and 1—1-yd. Sauerman Drag-Scraper and Slackline Outfits, complete.
2—15 H. P. Dbl Drum Clyde Hoists, gasoline.
3—30 H. P., C. H. & E. Dbl. Drum Hoists, gasoline.
30—Elect. Hoists, Sgl. and Dbl. Drum, 5 H. P. to 112 H. P. in both A. C. and D. C. Current.
2—Ligerwood Dbl. Drum Belted Hoists good for 8,000 lbs. sgl. line or 75 H. P. Max.
48-in. Symons Disc Crusher, latest type.
18-in. Bucket Elevator, complete.
200 H. P. Diesel Oil Engine, complete.
6-in. and 8-in. Manganese Sand Pumps, Belted.
13x18-in. Slide Valve Steam Engine.
All sizes electric Generators, Motors, Steam Boilers, Engines, Pumps, Crushers, Screens, Air Compressors, etc.

Lakeside Machinery Company
117 North Dearborn Street
Chicago, Illinois
Warehouses and Yards
4501 W. Cortland St. 2335 W. Austin Ave.

GASOLINE SHOVELS AND CRANES

1—1¼ Yd. Lorain 75 Cat. Shovel.
1—Link Belt Combination Cat. 1 Yd. Shovel and 50' crane boom.
1—Model 105 Northwest Combination ¾ yd. shovel and 40' crane boom.
1—Byers Bearcat Cat. with 30' crane boom.

GAS LOCOMOTIVES

1—12 ton Whitcomb standard gauge.
1— 7 ton Plymouth 36" gauge.

HOSTING ENGINES

1—60 HP National 3 drum 3 phase, 60 cycle 220 volts with swinger.
1—22 HP Lambert DD 3 phase, 60 cycle, 220 volts.
1—8¼x10 Stroudsburg Triple Drum Hoist with swinger. Boiler mounted.

DERRICKS

3—5 to 7 ton all-steel stiffleg derricks.
1—10 ton Wooden Stiffleg Derrick 80' boom.

BOILERS

1—100 HP Locomotive Type, ASME.
1—125 HP Locomotive Type, ASME.

DUMP CARS

6—4 yd. Western 36" gauge, steel beam and steel floors. Like new.

B. M. WEISS
1324 Widener Bldg. Philadelphia, Pa.